

GROUNDWATER MANAGEMENT PLAN

DELANO-EARLIMART IRRIGATION DISTRICT

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List of Abbreviations

AB	Assembly Bill
AF	Acre-feet
bgs	below ground surface
CVP	Central Valley Project
DBCP	dibromochloropropane
DEID	Delano-Earlimart Irrigation District
DWR	Department of Water Resources
EPA	Environmental Protection Agency
ET	evapotranspiration
F	Fahrenheit
FKC	Friant-Kern Canal
FWA	Friant Water Authority
FWUA	Friant Water Users Authority
GAC	Groundwater Advisory Committee
GMP	Groundwater Management Plan
GPM	gallons per minute
GPS	Global Positioning System
ID	Irrigation District
IRWMP	Integrated Regional Water Management Plan
NRCS	Natural Resources Conservation Service
SB	Senate Bill
TDS	total dissolved solids
USBR	United States Bureau of Reclamation
USGS	United States Geological Survey

1 - INTRODUCTION

This Groundwater Management Plan (GMP or Plan) is an update of a Plan that was adopted by the Delano-Earlimart Irrigation District (DEID) in December 2003. The original Plan was prepared in accordance with the requirements prescribed in Assembly Bill No. 3030 (California Water Code Section 10750 et seq.). The 2003 Plan was revised to satisfy the new requirements for GMPs created by the September 2002 California State Senate Bill No. 1938, which amended Sections 10753 and 10795 of the California Water Code. This Plan also addresses recommended components for a Groundwater Management Plan described in Appendix C of Department of Water Resources Bulletin 118 (2003 Update).

1.1 - Background Information on Delano-Earlimart Irrigation District

Below is a brief description of the origin, physiography, geology, water supplies and facilities in DEID.

Origin

The Delano-Earlimart Irrigation District (DEID) is a political subdivision of the State of California, formed in 1938 for the purpose of delivering water to growers within DEID. DEID's original water service contract with USBR was signed in 1950 for water delivery from the Friant Unit of the Central Valley Project (CVP). Use of CVP surface water in the District reversed a serious trend of declining groundwater levels that had been experienced since 1905.

Geography

DEID is located in southern Tulare County and northern Kern County on the eastern part of the San Joaquin Valley, about 10 miles west of the Sierra Nevada foothills, and northeast of the City of Delano (see **Attachment 1** for a vicinity map and **Attachment 2** for a location map). This GMP covers the area within the DEID boundaries, but the physiography and geology of neighboring lands are also discussed. The District covers about 56,500 acres (~88 square miles) of which about 92%, or 51,700 acres, is irrigated. The topography slopes generally from east to west at 10 to 25 feet to the mile. The White River passes through DEID, which owns a one-mile length of its channel.

Climate

The District is characterized as having hot and very dry summers, with relatively mild winters. Annual average precipitation and temperature are 7.9 inches and 62 degrees F, respectively. The majority of the rain falls during the winter and early spring months. It is not uncommon to have a four or five month period without significant rainfall during the late spring through early fall.

Soils and Agronomy

Refer to **Attachment 3** for a NRCS (Natural Resources Conservation Service) soils map of DEID. Soils in the district are deep and permeable with light to medium texture

underlain by hardpan. There are also small areas of lightly alkali-affected soils. About 51,700 acres, or 92% of the total District area, is cropped. Eighty percent of the total acreage in the District (95 percent of the irrigated acres) are planted in permanent crops (2006 data). Thus, it is important to have a firm water supply since most of the land cannot be fallowed in dry years. The major crops include grapes, pistachios, almonds, and other fruit and nut trees, with a total of 23 different crops grown (2006 data). Irrigation methods include drip and micro (62%), gravity (35%), and sprinkler (3%). The combined average irrigation efficiency is estimated to be about 75%.

Geology

DEID is located in both the Tule and Kern County Groundwater Sub-basins (see **Attachment 4**). The geological sequences of permeable, water bearing sediments within DEID, from youngest to oldest, are: 1) continental deposits, 2) the Santa Margarita formation, and 3) the Olcese sand. Sediments that comprise DEID's main groundwater basin are unconsolidated deposits of Tertiary and Quaternary age, including alluvium, lacustrine, deltaic, and flood plain deposits of sand and gravel. Thin lenses of silt and clay are scattered throughout the basin at various depths, but are most pronounced in the southwestern and northwestern portions of the basin. Recent standing groundwater levels average about 130 to 150 feet below ground surface (bgs). DEID cooperates with the USBR in monitoring groundwater levels. There are about 200 wells located throughout the District, all owned by water users. Refer to Section 2 for more details on the geology in DEID.

Water Supplies

DEID has a Federal CVP contract (175r-3327-LTR1) for up to 108,800 AF of Class 1 water and up to 74,500 AF of Class 2 water annually. In addition, the District enters into annual contracts for Section 215 water (surplus CVP water) from the United States Bureau of Reclamation. Because of the nature of Friant water supplies, annual District water supplies have ranged from a low of 34,000 AF to as much as 171,000 AF. Surface water deliveries averaged 115,000 - 120,000 AF/year from 1990 - 2002. During the same period, estimated groundwater pumping from private wells averaged 35,000 - 40,000 AF/year.

The District also contracts on an opportunity basis for water that can be delivered to lands not otherwise eligible to receive CVP water. Approximately 10% of the lands in the District are deemed ineligible to receive Friant water due to Federal Reclamation Law restrictions. Surface water for these lands is typically obtained through mutually beneficial exchanges with other Friant districts for local non-Friant water supplies.

Facilities

The Friant-Kern Canal flows from north to south through the District. The District delivers water from the Friant-Kern Canal to landowners through an extensive pipeline distribution system. The distribution system has 172 miles of concrete pipe, 503 irrigation turnouts, and 52 smaller metered deliveries (non-potable) to municipal and industrial water users. Because it's a completely closed system, losses are very low. In

recent years the District constructed the 80-acre Turnipseed Recharge Basin. The District also has a small 5-acre recharge basin near Highway 99.

For more information on DEID refer to the *Delano-Earlimart Irrigation District Water Management Plan – 2002 Update*.

1.2 - Goals and Objectives of Groundwater Management Plan

This GMP documents the existing groundwater management efforts in DEID and planned efforts to improve groundwater management. The purpose of the GMP is to help DEID meet the following objectives:

1. Preserve and enhance the existing quality of the area's groundwater.
2. Preclude surface or ground water exports that would reduce the long-term supply of groundwater.
3. Coordinate groundwater management efforts between regional water users.
4. Maintain local management of the groundwater resources.
5. Implement a groundwater-monitoring program to provide an "early warning" system to future problems.
6. Stabilize groundwater levels in order to minimize pumping costs and energy use, and provide groundwater reserves for use in droughts.
7. Maximize the use of surface water, including available flood water, for beneficial use.
8. Participate in regional efforts to effectively manage available water supplies when beneficial to project participants.

In addition, the District will take a proactive role in the legislative process. DEID will participate in development of sound legislation concerning groundwater management if it becomes necessary. DEID will also take an active role in opposing any legislation that is detrimental to local groundwater management efforts.

1.3 - Statutory Authority for Groundwater Management

The 2003 DEID Groundwater Management Plan was adopted according to statutory language in Assembly Bill No. 3030 (AB 3030). The GMP has been updated to include components listed in California Senate Bill No. 1938 (SB 1938). AB 3030, as chaptered, (California Water Code, Division 6, Part 2.75, SEC. 10750-10753.9) grants specified "local agencies" authority to undertake groundwater management. AB 3030 also confers upon local agencies the powers of a water replenishment district. These authorities remained unchanged with the amendments to the law provided by SB 1938. In addition, agencies adopting a GMP are authorized to enter into agreements with other local agencies or private parties to manage mutual groundwater supplies, including those existing in overlapping areas.

1.4 - Groundwater Management Plan Components

This GMP includes the required and voluntary components for a GMP as identified in California Water Code Section 10753, et. seq. This Plan is also consistent with the recommended elements for a GMP as identified in DWR Bulletin 118 (2003), Appendix C. **Table 1.1** identifies the location within this document where each of the components is addressed.

Table 1.1 – Location of Groundwater Management Plan Components

Description	Plan Section(s)
California Water Code Mandatory Requirements (10750 et seq.)	
1. Documentation of public involvement	1.5, Appendix A
2. Groundwater basin management objectives	1.2, 3
3. Monitoring and management of groundwater elevations, groundwater quality, land subsidence, and surface water	5
4. Plan to involve other agencies located in the groundwater basin	4.3
5. Monitoring protocols	5.3
6. Map of groundwater basin and agencies overlying the basin	Attachment 4
California Water Code Voluntary Components (10750 et seq.)	
7. Control of saline water intrusion	6.3
8. Identification and management of wellhead protection areas and recharge areas	6.2, 7.2
9. Regulation of the migration of contaminated groundwater	6.3, 6.4
10. Administration of well abandonment and well destruction program	6.1
11. Mitigation of overdraft conditions	7.1, 7.2
12. Replenishment of groundwater extracted by water users	7.2
13. Monitoring of groundwater levels and storage	5.1, 9.2
14. Facilitating conjunctive use operations	7.3
15. Identification of well construction policies	8.1
16. Construction and operation by local agency of groundwater contamination cleanup, recharge, storage, conservation, water recycling, and extraction projects	6.4, 7, 8.2
17. Development of relationships with state and federal regulatory agencies	4.2, 4.3
18. Review of land use plans and coordination with land use planning agencies	9.1
Additional Components Recommended by DWR (App. C of Bulletin 118)	
19. Advisory committee of stakeholders	4.1
20. Description of the area to be managed under the Plan	1.1, 2
21. Descriptions of actions to meet management objectives and how they will improve water reliability	4 - 9
22. Periodic groundwater reports	9.2
23. Periodic re-evaluation of Groundwater Management Plan	9.4

1.5 - Adoption of Plan

Refer to **Appendix A** for documentation on the adoption of the GMP and the public process that was followed.

Public Participation in Plan Development

The public was invited to participate in the development of the updated GMP through newspaper notices and public hearings.

Groundwater Advisory Committee

A Groundwater Advisory Committee (GAC) was formed to help update the GMP (see Section 4.1 for more details on the GAC). The initial GAC consisted of the DEID Board of Directors, which were given a copy of the GMP for review and comments. At a meeting on July 12, 2007 the draft GMP was presented and explained to the GAC. Comments were solicited on the GMP content and ideas for improving groundwater management.

The initial GAC was later replaced with an expanded GAC with a diverse membership consisting of 14 growers from throughout the District. The new GAC met on August 1, 2007, where the draft GMP was presented for review and comment. Copies of the draft GMP were given to each GAC member, with the invitation to provide additional comments.

Public Notice of Intention to Update the Groundwater Management Plan

As required by the California Water Code, a public hearing was duly noticed on June 7, 2007 and June 14, 2007 consistent with California Water Code Section 10753.2(a), and held on June 21, 2007, to discuss updating DEID's existing GMP. No public comments beyond those offered by the GAC were received at this meeting.

Resolution of Intention to Update the Groundwater Management Plan

DEID adopted a Resolution of Intention to Update the Groundwater Management Plan on June 21, 2007. This resolution was then published on July 5, 2007 and July 12, 2007 consistent with California Water Code Section 10753.2(a).

Public Notice of Intention to Adopt the Updated Groundwater Management Plan

As required by the California Water Code, a public hearing was duly noticed on July 26, 2007 and August 2, 2007, consistent with California Water Code Section 10753.2(a), and held on August 9, 2007 to discuss adoption of the updated GMP. No public comments were received at this meeting.

Resolution Adopting the Updated Groundwater Management Plan

DEID adopted a Resolution to Adopt the Updated Groundwater Management Plan on August 9, 2007. This resolution was then published on August 16, 2007 and August 23, 2007 consistent with California Water Code Section 10753.2(a).

2 - GEOLOGY AND HYDROGEOLOGY

This section discusses the geology and hydrogeology of DEID and the surrounding area. The purpose of this section is to provide general background information on the local hydrogeology that will aid in selecting and implementing groundwater management programs. Most of the information in this section was derived from USBR (December 1950), Provost and Pritchard (2000), DWR (2003) and Klausning and Lofgren (1969).

2.1 - Regional Geology

The Delano-Earlimart Irrigation District (DEID) is located entirely within the confines of the San Joaquin Valley. Numerous United States Geological Survey (USGS) reports discuss the San Joaquin Valley as being a large asymmetric structural trough that has been receiving sediments from the Sierra-Nevada Mountains to the east and from the Coast Ranges to the west. In the area of DEID, these sediments and corresponding structures control the direction of groundwater flow and the quality of groundwater available to wells. In general, DEID is underlain by (oldest to youngest) basement complex meta-sedimentary and meta-volcanic, and intrusive plutonic rocks. The basement complex is overlain by Tertiary marine sediments that in turn are overlain by continental rocks and deposits. All of these units dip and thicken to the west under the District from a thickness of about 4,000 feet near Richgrove to about 7,000 feet thick under Delano. The focus of this report is to present the significant hydrogeological deposits underlying the District.

Groundwater Basin

DEID is located in the Tulare Lake Hydrologic Region. This region has 12 distinct groundwater basins and 7 subbasins. DEID is located in two of the subbasins: the Kern County Sub-basin and the Tule River Sub-basin (**Attachment 4**). The majority of the District is located in the Tule Sub-basin. Both of the Sub-basins are considered to be critically overdrafted. According to DWR Bulletin 118, 2003 update, eleven basins/subbasins in California are identified as being in critical conditions of overdraft.

Topography

DEID lies on the eastern side of the San Joaquin Valley and includes three types of topography: rolling foothills to the east, remnants of original Pleistocene aggraded alluvial terraces, and floodplains and alluvial fans built by present streams. The rolling foothills to the east have pronounced relief that can be as much as 100 feet higher in elevation than the District lands. West of the foothills are remnants of the original surface of the Older Alluvium. These features are broad undulating slopes that extend to about 15 feet above the ephemeral drainage courses. Most of the District is covered by the floodplains and fans of present streams. White River and Rag Gulch meander on floodplains, which widen westerly into broad aprons forming alluvial fans.

2.2 - Stratigraphy

The following discussion focuses on significant hydrogeologic units that could have an impact on the groundwater resources within the District. From the surface to a depth of approximately 3,000 feet important hydrogeologic units are topsoil, continental rocks and deposits, and the uppermost section of the marine sediments. Depth to bedrock is too deep under most of the District to impact groundwater conditions and therefore will not be discussed here.

Topsoils

Topsoils in the DEID area consist of permeable to moderately permeable and poorly permeable deposits. Permeable to moderately permeable soils cover the majority of the District and correspond to soils in the Kimberlina, Wasco, and Panoche series. These soils are roughly contiguous with recent alluvial fan and flood-basin deposits having formed on mixed granitic and sedimentary alluvium. These soils are very deep, well drained, and lack hardpan horizons. The poorly permeable surface deposits in the area correspond to soils in the San Joaquin, Cometa, and Madera series. These soils are located in the northeast and southeast portions of the District in interfan areas and are formed on slightly dissected older stream terraces derived mainly from granitic rock sources. These soils have dense horizons and hardpans that could impede percolation of recharged groundwater.

Subsurface Geology

The upper portion of the Marine Deposits and the Continental Deposits comprise the main groundwater reservoirs in DEID. Klausen and Lofgren (1969) provided two subsurface cross sections that extend east to west in the area. The northern of the two cross sections is located between Earlimart and Pixley just north of the District boundary and the southern cross section runs through Richgrove and the City of Delano. These cross sections show the westward dipping trend of the Marine and Continental Deposits beneath the District.

Marine Sediments

The Basement complex is overlain by west dipping Tertiary marine sediments in the District. For the most part the Tertiary sediments have little influence on groundwater with the exception of the Santa Margarita Formation and Olcese Sand. Both sands are friable, massive, fine to medium grained, contain varying amounts of silt, and have fair to good permeabilities. The Santa Margarita is about 400 feet thick along the eastern margin of the District and is found at depths of 2,000 feet or more. It becomes progressively finer to the west and grades into shale under the central part of the District. The Olcese Sand is about 400 feet thick and is found beneath the entire District at depths from about 2,500 feet near Richgrove to about 5,000 feet near the western edge of the District. Both of these units are known to have good quality water east of the Friant-Kern Canal. The

Santa Margarita Formation and/or the Olcese sand are tapped by several wells in the Richgrove area and the wells show yields up to 1,950 gpm.

Continental Deposits

The Lofgren and Klausing cross sections show alluvial deposits, both oxidized and reduced, originating from the Sierra-Nevada to the east extending to depths from about 600 feet near Richgrove to approximately 1,000 feet near Delano. These deposits, termed Older Alluvium, are a significant part of the area's aquifer being commonly tapped by wells. Below the alluvium are deposits termed Continental Deposits from the Sierra Nevada. These deposits like the Older Alluvium deepen and thicken to the west and south, and are commonly tapped by wells. However, east of Highway 99 these deposits contain brackish water at depths of approximately 2,000 feet. USBR (December 1950) indicates that the Older Alluvium and the underlying Continental Deposits are members of the Kern River Series, in which the Kern River Formation would correspond to the Continental Deposits and underlie the Older Alluvium. Most groundwater stored in the area is in the Kern River Formation.

USBR (December 1950) discusses a significant water-bearing sand layer within the Continental Deposits (Kern River Formation) called the Schenley Sand. The Schenley Sand, a thick sand member, underlies the western and central portions of the District. It is 1,000 to 1,500 feet deep and thickens from less than 100 feet in the east to almost 600 feet in the west. The top of the Schenley sand is between 50 to 100 feet below the Blue clay (discussed below). USBR (December 1950) states that the Schenley Sand is the most important aquifer in the area. In addition to the Schenley Sand, the Kern River Formation also contains a significant clay layer called the Blue Clay or "300 foot" clay. The Blue Clay is about 300 feet deep and 50-100 feet thick. As of 1950, water contained in the Schenley Sand was thought to be confined by the overlying Blue Clay thus improving its water-bearing properties.

A widespread lacustrine clay layer (Corcoran Clay member of the Tulare Formation) is present in the area extending in the subsurface westerly from just east of Highway 99. Along its eastern edge, the Corcoran Clay is approximately 200 feet below ground surface (bgs) and deepens to about 500 feet bgs towards the center of the Central Valley. The Corcoran Clay averages between 50 to 80 feet thick and is generally used to differentiate between a lower confined aquifer and an upper unconfined aquifer west of its eastern extent.

Younger Alluvium

Younger Alluvium occupies the channels and floodplains of the White River, Rag Gulch, and other minor streams of the area. These materials are composed of sands, with interstitial finer material. Silty lenses are common but clay is seldom found.

2.3 - Aquifer Characteristics

Specific Yield

USBR (December 1950) derived estimates of specific yield for a lower zone and upper zone within the District. These values are based on specific yield estimates from studies done in similar geologic settings. The upper zone includes the depth interval dewatered between 1921 and 1946 (approximately 90 to 200 feet bgs). This zone averages 7.5 percent specific yield. It is important to note that a significant portion of the upper zone has been partially re-watered since the District began receiving CVP surface water in 1950.

The lower zone is the interval from the 1946 low water table to the top of the lower Blue Clay. This zone historically supplied much of the water production in the District. This zone has an average specific yield of 8.7 percent in the central and southwest portions of the District. Specific yield data is lacking in the remainder of the District. Areas of higher specific yields correspond to deposits of the White River and Rag Gulch. Specific yields associated with Rag Gulch deposits average about 10 percent. Specific yields associated with the White River floodplain are greater than 10 percent and extend further west than the Rag Gulch "high"—a lobe of highly transmissive Younger Alluvium associated with recent Rag Gulch deposits. A large "depression" of low specific yields—less than 6 percent—lies along the Tulare County line. Many of the area's wells are in or adjacent to this area, and, due to its relatively shallow depth, derive little of their water from above the Blue clay.

Below the Blue Clay, the specific yield of the Schenley Sand is estimated to be as high as 15 to 20 percent. No information was available on the specific yields in the Santa Margarita Formation or the Olcese sands.

Safe Yield

In 1950, the USBR stated that the safe firm groundwater supply in DEID was 1,100 AF/year. However, conditions have changed substantially since then and this value is no longer considered valid. Provost and Pritchard (2006) indicated that surface water deliveries averaged 115,000-120,000 AF/year for the time interval from 1990 to 2002. Over the same interval groundwater pumpage for agricultural purposes averaged 35,000-40,000 AF/year, but groundwater levels remained relatively stable (**Attachment 6**). This suggests that safe yield for the District with CVP surface water deliveries is on the order of average groundwater pumpage.

Transmissivity

Transmissivity data from the literature is sparse. A study by Davis et al., (1964) summarized numerous specific capacity values from Pacific Gas & Electric pump tests. Using data from more than 300 field tests in the DEID District area, they calculated specific capacities ranging from 19 to 27 gpm per foot. An approximate relationship

between specific capacity data and transmissivities was developed by the U.S. Geological Survey for the San Joaquin Valley. Using their methods, transmissivity values for the District and immediately surrounding areas range from 38,000 to 82,000 gpd/ft.

Wells Yields and Depths

The deepest irrigation wells in the area are generally along Highway 65, where some are deeper than 2,000 feet, and probably tap the Santa Margarita Formation and/or the Olcese sand. These wells (in the Richgrove area) are known to produce as much as 1,950 gpm. Domestic wells are commonly less than 200 feet deep and most irrigation wells are less than 700 feet deep. Most modern-day irrigation wells range from about 400 to 600 feet deep. According to DWR (2003), wells in the Tule subbasin can have yields as high as 3,000 gpm and wells in the Kern County subbasin can have yields as high as 4,000 gpm averaging between 1,200-1,500 gpm.

2.4 - Groundwater Levels

Current groundwater levels in DEID and surrounding Districts are shown on **Attachment 5**. Average groundwater depths are currently about 130 feet. The period of record from about 1925 to 1950 is marked by a steady decline in average groundwater levels under the District (see **Attachment 6**). For this period, the water table declined approximately 125 feet (90 feet to 215 feet bgs). Between 1950 and 1954, water levels remained fairly level. From 1950 to 2000, average water levels have recovered 95 feet, equal to about 72 percent of pre-CVP deliveries. In general, groundwater levels fluctuate in response to the amount of surface water delivered but are now considered to be fairly stable.

Attachment 5 shows a steep east-dipping groundwater gradient in the Richgrove area, which indicates that in this portion of the District groundwater flows out of DEID. In other parts of the District, the groundwater generally appears to follow the regional groundwater gradient (southwesterly), but is also influenced by some local pumping depressions.

2.5 - Groundwater Quality

Groundwater quality in DEID is known only from limited and sporadic testing. Groundwater appears to have suitable chemical quality for irrigation in most of DEID, although there may be some localized problems.

Generally, water is considered suitable for agriculture if the total dissolved solids (TDS) is less than 700 mg/L (Cherry, 1979). According to DWR (2003), TDS in the Tule Groundwater Sub-basin averages 256 mg/L with a range from 200 to 30,000 mg/L. In the Kern County Groundwater Sub-basin, TDS averages 400-450 mg/L, with a range from 150 to 5,000 mg/L. According to P&P (2006), TDS in DEID averages 330 mg/L over the entire saturated thickness of the usable aquifer, and 490 mg/L in the shallow mixing zone. An overall trend is for lower salinity at greater depths; this has been

shown in a number of test holes for wells in the Delano-McFarland areas, and has been observed by DEID staff and local growers.

Elevated nitrate concentrations are found in the shallow groundwater, particularly in areas where citrus is grown. The pesticide DBCP has also been found in shallow groundwater. This pesticide was formerly used as a nematocide, and reached the groundwater primarily in areas where vineyards are grown on sandy soil underlain by sandy alluvium. Because of this, areas with DBCP in the shallow groundwater may coincide with hydrogeologically favorable areas for intentional recharge. Groundwater below a depth of 1,100 to 1,200 feet in the Delano-McFarland area (south of DEID) contains blue-green deposits, and hydrogen sulfide is common in the associated groundwater.

Underlying the fresh water contained in the regional aquifer system is a zone of brackish and saline waters. These waters originated as connate sea water remaining in the deep valley sediments as the valley filled with younger sediments and the sea water was displaced by fresh water emanating from the Sierra Nevada to the east and the Coast Ranges to the west. The trapped brackish water occurs at a depth of greater than 2,000 feet in the east part of the District and shallows to a depth of about 1,500 feet in the west part of the District. The deeper saline water on the east side is presumably due to flushing of fresh water from subsurface inflow originating from Sierran streams.

Upconing of saline water can be induced by deep wells that pump from near the saline-fresh water interface. Pumping freshwater by a well located above the transition zone produces upconing of the latter, eventually salinizing the pumped water, forcing shut-off. Following the well's shut-off, the upconed saltwater mound undergoes decay, tending to return to the pre-pumping regime (Zhou, 2004). This condition could occur in DEID in very deep wells (>1,500 feet deep).

3 - BASIN MANAGEMENT OBJECTIVES

The District's basin management objectives include the following primary elements:

- Stakeholder Involvement;
- Monitoring Program;
- Groundwater Resources Protection;
- Groundwater Sustainability;
- Groundwater Operations; and
- Groundwater Planning and Management.

This GMP includes a number of activities that the District intends to evaluate or undertake for each of these primary elements. The subsequent sections describe both existing and planned management actions, and how each action will contribute to a more reliable groundwater supply.

Existing Activities

- All existing and on-going basin management objectives described in Sections 4-9 will be maintained, unless stated otherwise. (In Sections 4-9 the Existing Activities are not repeated under Planned Actions, even though they will be continued in the future).

Planned Actions

- All new policies and projects described in Sections 4-9 will be pursued, but their implementation will be subject to available funding and staff time.

4 - STAKEHOLDER INVOLVEMENT

4.1 - Groundwater Advisory Committee

A Groundwater Advisory Committee (GAC or Committee) was formed in 2007 to assist with the development of this GMP. The initial Committee was comprised of the DEID General Manager and the District Board of Directors, which includes a broad cross section of local growers. The GAC was reconstituted in July of 2007 to include 14 growers that represent a diverse cross-section of DEID. The GAC offered several useful and insightful comments that were incorporated into this GMP. The GAC will also monitor and evaluate the technical progress made in achieving the goals of this GMP.

Existing Activities

Assisted with the development of this GMP.

Planned Actions

The Committee will attempt to meet annually, or more frequent if deemed appropriate, and will have the following responsibilities:

- Review trends in groundwater levels and available information on groundwater quality;
- Evaluate the effectiveness of current groundwater management policies and facilities;
- Discuss the need for new groundwater supply/enhancement facilities;
- Educate landowners on groundwater management issues;
- Assess the overall progress in implementing the programs outlined in the Groundwater Management Plan;
- Recommend updates or amendments to the Groundwater Management Plan;
- Identify regional and multi-party groundwater projects; and
- Review and comment on the Annual Groundwater Report.

4.2 - Relationships with Other Agencies

The District is located in the both the Kern County and Tule Groundwater Sub-basins, which extends beyond many political boundaries and includes other municipalities, irrigation districts, water districts, private water companies, and private water users (see **Attachment 4**). This emphasizes the importance of inter-agency cooperation, and the District has historically made efforts to work conjunctively with many other water management agencies.

Below is a list of some agencies that the District has worked with in managing the local groundwater:

- Friant Water Authority
- Friant Water Users Authority

- United States Bureau of Reclamation
- Department of Water Resources
- Poso Creek Regional Management Group
- Southern San Joaquin Valley Water Quality Coalition
- Deer Creek and Tule River Authority
- Local irrigation and water districts (Pixley Irrigation District, Kern-Tulare Water District, Rag Gulch Water District, etc.)
- Kern County Water Agency

Existing Activities

Friant Water Authority

The Friant Water Authority (FWA) is a joint powers authority comprised of 22 member districts located in Fresno, Tulare, and Kern Counties. In addition to its primary mission of operating and maintaining the Friant-Kern Canal, FWA also addresses various water supply, financial, legislative, legal and other policy issues on behalf of its members. As a member of FWA, DEID is almost always involved in several multi-agency water management projects.

Friant Water Users Authority

The Friant Water Users Authority (FWUA) is a joint powers authority that has member districts in Madera, Fresno, Tulare, and Kern Counties. The FWUA is staffed by employees of the Friant Water Authority under an agreement between the two organizations. FWUA is maintained to work on projects and legal matters that preceded the formation of the Friant Water Authority.

USBR/DWR

DEID currently participates in the Semi-annual Groundwater Measurement Program administered by the USBR. This program requires DEID to take water level measurements from specified wells two times a year and share the data with USBR. USBR shares this data with the DWR.

Water Quality Coalition

DEID is a member of the Southern San Joaquin Valley Water Quality Coalition (Coalition). The Coalition encompasses the entire Tulare Lake Basin (4.4 million acres) and is comprised of four subwatershed groups (Kings, Kaweah, Tule and Kern River). DEID is a member of the Kern River subwatershed group. The Coalition is organized under a MOU, adopted in 2002, to jointly and cooperatively address water quality issues. The Coalition monitors surface water (irrigation and stormwater) and prepares annual reports. In 2005-2006, the water quality in the White River in DEID was tested as part of Coalition efforts.

Poso Creek Regional Management Group

The Poso Creek Regional Management Group (Poso Creek Group) comprises the seven agricultural districts and one resource conservation district listed below:

- Semitropic Water Storage District (Lead Agency)
- Cawelo Water District
- Delano-Earlimart Irrigation District
- Kern-Tulare Water District
- North Kern Water Storage District
- Rag Gulch Water District
- Shafter-Wasco Irrigation District
- North West Kern Resource Conservation District

These Districts are all within the Tulare Lake Basin Hydrologic Region and are located in the northerly portion of Kern County. The Poso Creek Group is in the process of preparing an Integrated Regional Water Management Plan (IRWMP). The IRWMP is planned for completion in 2007. The IRWMP emphasizes resolving the Region's short-term and long-term water supply challenges through an integrated water-resource planning approach. The group has already identified numerous multi-agency projects, including several that could benefit DEID's groundwater resources.

Deer Creek and Tule River Authority

In 2007, DEID began preparing regional groundwater contour maps with six neighboring agencies (Deer Creek and Tule River Authority). See Section 5.1 for more details.

Pixley Irrigation District

Pixley ID is DEID's neighbor to the north. DEID and Pixley ID are jointly pursuing a Groundwater Banking Reconnaissance Study to investigate the feasibility of banking surplus waters from DEID in Pixley ID during wet years (likely delivering the water to Pixley ID growers as in-lieu recharge), and returning a similar quantity of water to DEID in dry years from Pixley ID's banked reserves. The project is currently envisioned to be able to deliver between 10,000 AF and 30,000 AF of water to DEID in a dry year. The reconnaissance study is expected to be completed in mid-2007.

Kern County Water Agency

DEID is a member district of the Kern County Water Agency (KCWA) and works cooperatively on water projects and data development that is of mutual interest to each member.

Planned Actions

- Implement multi-agency projects identified in the Poso Creek Group IRWMP.

4.3 - Plan to Involve the Public and Other Agencies

The District is already involved with many neighboring and regional agencies on groundwater management projects. Nevertheless, DEID is always interested in building new relationships with other agencies that share the same groundwater basins. DEID will also strive to involve the public in groundwater management decisions. Additional cooperative relationships can be achieved through the sharing of data, inter-agency committees, interagency meetings, memorandums of understandings, formal agreements, and collaborations on groundwater projects.

Existing Activities

- Conducted public hearings to discuss the content of this GMP prior to its adoption.

Planned Actions

- Hold annual Groundwater Advisory Committee meetings that are open to the public.
- Provide copies of the annual groundwater reports to the public at their request. Notify the public of the availability of the annual reports on the DEID website and quarterly newsletter.
- Publish information on groundwater management accomplishments on the DEID website and quarterly newsletter.
- Evaluate the merits of engaging the City of Delano and the Community of Earlimart in discussions on groundwater issues, such as groundwater levels, groundwater quality, groundwater recharge, and the use of reclaimed water.
- Utilize the GAC in reviewing and monitoring any new recharge and banking facilities that may be pursued.

5 - MONITORING PROGRAM

This section discusses monitoring of groundwater levels, groundwater quality, land surface subsidence, and surface water. Monitoring is considered critical to future management decisions, and the District's monitoring program is intended to:

1. Provide warning of potential future problems;
2. Use data gathered to generate information for water resources evaluations;
3. Develop meaningful long-term trends in groundwater characteristics; and
4. Provide data comparable from place to place in the District.

5.1 - Groundwater Level Monitoring

Groundwater level monitoring in DEID includes data collection, entering the data into a database, sharing the data with other agencies, and development and evaluation of groundwater contour maps.

Data Collection

DEID hires a contractor to measure water levels each spring and fall in about 90 wells. DEID only owns one monitoring well; all other monitored wells are privately owned and are monitored by agreement with the owner. **Attachment 7** illustrates the location of all the wells that are monitored. **Attachment 8** includes a list of attributes for these wells. DEID also has a photograph of each monitoring well. DEID plans to collect more detailed well attribute information (such as well depth, screened interval, type of well, etc.) in the future. The location of each well was determined with a hand-held GPS device. A more accurate survey may be performed in the future.

Sharing of Groundwater Level Data

DEID currently participates in the Semi-annual Groundwater Measurement Program administered by the USBR. This program requires DEID to take water level measurements from specified wells two times a year and share the data with USBR.

Groundwater Database

The DEID maintains a spreadsheet groundwater database with historical groundwater-level data as far back as the 1950's in some wells. This data has been used to generate groundwater elevation contours. In 2007, DEID was developing a Geographic Information System geo-database with groundwater level data from DEID and neighboring districts. This geo-database will be used to create regional contour maps, which are discussed below.

Groundwater Contour Maps

In 2007, DEID began preparing regional groundwater contour maps with the following districts: Lower Tule River Irrigation District, Pixley Irrigation District, Saucelito Irrigation District, Porterville Irrigation District, Vandalia Irrigation District, and Tea Pot Dome

Water District. This group is collectively called the Deer Creek and Tule River Authority. Groundwater level data was collected from the California DWR for 900 wells. Maps have been prepared for each year from 1995-2005 and the group plans to continue preparing the maps annually. The districts have found that preparation of regional maps is more cost effective than having each district individually prepare their own maps. The regional maps also provide more accurate contours near district borders, since groundwater levels in neighboring districts can now be used in the generation of contours.

Existing Activities

- Measurement of groundwater levels each spring and fall.
- Development of regional groundwater contour maps with the Deer Creek and Tule River Authority.

Planned Actions

- Periodically review the monitoring network to determine if it provides sufficient areal coverage to evaluate groundwater levels.
- Protect wells in monitoring program from being abandoned.
- Encourage landowners and developers to convert unused wells to monitoring wells.
- Collect more detailed information on the attributes of each monitoring well.
- Prepare annual groundwater reports, which will include detailed evaluations of groundwater level trends (see Section 9.2).
- Survey the elevations of all monitoring well heads using a common survey datum.

5.2 - Groundwater Quality Monitoring

The District has not historically monitored groundwater quality and has left individual growers the responsibility of testing groundwater quality in their own wells. However, the District may begin to monitor groundwater quality in the vicinity of new groundwater recharge facilities, if they are constructed. The District would also like to measure electrical conductivity in selected wells each year. The District also has a tentative goal to collect and review the results from groundwater quality tests performed by others, such as the Cities of Delano and Earlimart, USBR, DWR and USGS. However, it is recognized that data from these sources is probably limited and is not regularly available. After a moderate amount of data is collected, a groundwater database will be created to store, organize, and evaluate the water quality data.

These groundwater quality-monitoring efforts will have one or more of the following objectives:

- 1) Spatially characterize water quality according to soils, geology, surface water quality, and land use;
- 2) Establish a baseline for future monitoring;
- 3) Compare constituent levels at a specific well over time (i.e. years and decades);
- 4) Determine the extent of groundwater quality problems in specific areas;
- 5) Identify groundwater quality protection and enhancement needs;

- 6) Determine water treatment needs;
- 7) Identify impacts of recharge and banking projects on water quality;
- 8) Identify suitable crop types that are compatible with the water characteristics; and
- 9) Monitor the migration of contaminant plumes.

Existing Activities

None

Planned Actions

- Collect historical water quality information for DEID to establish a baseline for future monitoring efforts.
- Regularly collect new water quality information from other agencies and review it to identify any impending groundwater quality problems.
- Protect wells in monitoring program from being abandoned.
- Prepare groundwater quality maps when sufficient information is available with the aid of a qualified hydrogeologist. Attempt to characterize groundwater quality with depth and provide the information to growers so they can use it when designing and installing wells.
- Measure electrical conductivity at selected wells on an annual basis.

5.3 - Groundwater Monitoring Protocols

Monitoring protocols are necessary to ensure consistency in monitoring efforts and are required for monitoring evaluations to be valid. Consistency should be reflected in factors such as location of sample points, sampling procedures, testing procedures, and possibly even time of year when the samples were taken. Without such common ground, comparisons between reports must be carefully considered. Consequently, uniform data gathering procedures will be practiced by the District. Specific protocols for water level and water quality monitoring are discussed below.

Water-Level Monitoring Protocols

The District hires a contractor to measure groundwater levels. No information is available on their protocols, but the following protocols are recommended for all future efforts:

- Contact landowners for permission to access their property prior to any fieldwork.
- Perform all water level measurements in as short a period as possible.
- Perform year-to-year measurements at the same time of the year.
- Document the measurement reference point for each well, the measuring device, and calibration date for the measuring device.
- A well sounder with an electronic sensor is preferred over a sonic sounder (since it provides more accurate measurements).
- Document the date and time of each measurement.
- Test the groundwater level in each well twice, or more if needed, until consistent results are obtained.

- If there is reason to suspect groundwater contamination, decontaminate water level measuring equipment, and in general, perform measurements from the least to the most contaminated wells. Also use standardized decontamination procedures.

Water-Quality Monitoring Protocols

The following water-quality monitoring protocols will be followed for future monitoring efforts:

- 1) Landowners will be contacted for permission to access their property prior to any fieldwork.
- 2) Pump well for an adequate period of time prior to sample collection with documentation of stabilized parameters;
- 3) Use proper sample containers, preservatives, and holding times;
- 4) Use secure chain-of-custody procedures;
- 5) Ideally, use the same laboratory for all testing, except for split samples sent to separate laboratories for comparison;
- 6) Perform tests only at accredited, state-certified laboratories that use proper quality control and quality assurance procedures;
- 7) Give each sample a quality assurance code, which represents the relative confidence in the water sample. The following codes will be used:
 - 0: No information available to rank the quality assurance
 - 1: Questionable measurement; some quality assurance procedures not followed
 - 2: Reliable measurement with all quality assurance procedures followed
- 8) Include spiked, duplicate, and field-blank samples for comparison to genuine samples;
- 9) Use proper handling procedures (e.g. placing the containers in an ice chest immediately after collection);
- 10) Document all protocols and procedures;
- 11) Perform year-to-year measurements at the same time of year (during periods of both minimal pumping in the winter and heavy pumping in the summer); and
- 12) Document the name, contact information, and qualifications of the individuals taking measurements.

Existing Activities

None

Planned Actions

- Review the suitability and thoroughness of the monitoring protocols used by the contractor that monitors groundwater levels for DEID.

5.4 - Surface Water Monitoring

Surface water sources in DEID include the White River, an ephemeral stream traversing the District, and San Joaquin River water, which is delivered to DEID through the Friant-Kern Canal.

White River

White River is an intermittent waterway that traverses the District flowing from east to west. The White River watershed is located in the Sierra Nevada Mountains immediately east of the District and historically ended in an undefined flood plain that eventually reached Tulare Lake. The White River channel has been modified and resembles a canal along much of the District.

The District owns a small section of the White River channel, approximately one mile in length. Other than this section, the District has no responsibility for operation and maintenance of the White River channel. However, as a public service to the District landowners and surrounding communities, the District facilitated the installation of and maintains two gauging stations on White River that are in addition to an existing station that was established by the USGS a number of years ago. The District and others use these stations to monitor River levels, rainfall, and other meteorological conditions. Real-time information from each station is accessible through a quick link on the DEID website, www.deid.org.

The riverbed is sandy and experiences high infiltration. Consequently, flows rarely reach DEID, but White River flows did occur in DEID during the relatively wet years 2005-2006. The quality of White River run-off was tested in 2005-2006 as part of efforts by the Southern San Joaquin Valley Water Quality Coalition. The Coalition will continue to test the water quality when flows reach the District.

Friant-Kern Canal

The Friant-Kern Canal traverses DEID from north to south. The Canal delivers Central Valley Project water from Millerton Lake to DEID and numerous other agencies. DEID monitors diversions from the Friant-Kern Canal and the Friant Water Authority monitors water quality in the Canal. The quality of this water is very good; total dissolved solids range from about 30 to 50 mg/L.

Surface water flows can impact groundwater levels and groundwater quality if the two water sources are hydrologically connected. In addition, pumping may also affect nearby surface water rights if the surface supplies are hydrologically connected to the groundwater. Neither of these issues are a concern for the White River or Friant-Kern Canal.

Existing Activities

- Monitor flowrates in the White River.
- Monitor surface water quality in the White River.

- Periodically review data on the quality of Friant-Kern Canal water.

Planned Actions

None

5.5 - Land Surface Subsidence Monitoring

Klausing and Lofgren (1969) documented substantial land subsidence in DEID through the 1960's. No information was found on subsidence rates since the 1960's. There is often a time delay in subsidence after groundwater withdrawals, so the District may still be experiencing subsidence. In addition, groundwater levels can drop appreciably in extended droughts, which could also lead to subsidence in DEID. On the other hand, it is likely that some of the land subsidence has been arrested with the importation of large volumes of surface water since the 1950's. Lands within the District will be observed for land subsidence, and, if land subsidence becomes a problem, this Plan will be amended to include preventative and mitigative measures.

Existing Activities

None

Planned Actions

- Periodic resurvey of control points and local benchmarks to check for land subsidence. The control points and local benchmarks will be checked relative to High Precision Geodetic Network benchmarks.

6 - GROUNDWATER RESOURCES PROTECTION

6.1 - Well Abandonment

Proper destruction of abandoned wells is necessary to protect groundwater resources and public safety. Abandoned or improperly destroyed wells can result in contamination from surface sources, or undesired mixing of water of different chemical qualities from different strata. This is especially important in DEID because part of the District has a confined aquifer.

The administration of a well construction, abandonment and destruction program has been delegated to the Counties by the State legislature. Many counties have adopted a permitting program consistent with Department of Water Resources Bulletin 74-81 for well construction, abandonment, and destruction.

The District will properly abandon their own wells when they are no longer useful. In addition, the District will encourage landowners and developers to properly abandon their own wells, or preferably, convert unusable wells to monitor wells so that they can become a part of the District's groundwater monitoring program.

Existing Activities

None

Planned Actions

- Destroy any District owned wells according to County and State standards.
- When possible, convert unusable production wells to monitor wells.

6.2 - Wellhead Protection

Need for Wellhead Protection

Contaminants from the surface can enter an improperly designed or constructed well along the outside edge of the well casing or directly through openings in the well head. A well is also the direct supply source to the customer, and such contaminants entering the well could then be pumped out and discharged directly into the distribution system. Therefore, essential to any wellhead protection program are proper well design, construction, and site grading to prevent intrusion of contaminants into the well from surface sources.

Furthermore, since wells can be a direct conduit to the aquifer, they must be properly destroyed and abandoned or they will provide an unimpaired route for pollutants to enter the groundwater, particularly if pumping equipment is removed from the well and the casing is left uncapped. Well Abandonment is discussed in Section 6.1.

Wellhead Protection Policy

Wells constructed by the District will be designed and constructed in accordance with DWR Bulletin 74-81. In addition, the District will encourage landowners to follow the same standards for privately owned wells. DWR Bulletin 74-81 provides specifications for the following:

- Methods for sealing the well from intrusion of surface contaminants;
- Covering or protecting the boring at the end of each day from potential pollution sources or vandalism;
- Site grading to assure drainage is away from the well head; and
- Set-back requirements from known pollution sources.

Wellhead Protection Area

As defined in the Federal Safe Drinking Water Act Amendments of 1986, a wellhead protection area is "the surface and subsurface area surrounding a water well or well field supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or well field." Agricultural wells are randomly spaced throughout the District. Therefore, the entire District is treated as a wellhead protection area.

Existing Activities

None

Planned Actions

- Provide wellhead protection on all newly constructed DEID wells according to County and State standards.
- Encourage local growers to incorporate proper wellhead protection into all new wells, and retrofit old wells with proper wellhead protection.

6.3 - Saline Water Intrusion

Saline water has been identified at depths (>1,500 feet) beneath the District but no wells are currently known to be affected by this zone of saline water. Saline water intrusion could be impacted by upconing if very deep wells are installed and used (see Section 2.6 for more details). The District will review available water quality data on a periodic basis. Should saline intrusion become a problem in the future, a GMP amendment will be prepared to address the issue. Currently, the District strives to prevent the importation of saline surface waters that could ultimately degrade the groundwater. When alternative water sources are available for importation, the District considers not only the cost but also the quality, including salinity, of the water. The District will evaluate all possible alternatives, and, when practical and feasible, select water sources with acceptable levels of salinity.

Existing Activities

None

Planned Actions

- Review available water quality data to identify areas with the potential for saline water intrusion.

6.4 - Migration of Contaminated Groundwater

Groundwater contamination can be human induced or caused by naturally occurring processes and chemicals. Sources of groundwater contamination can include irrigation, dairies, improper application of agricultural chemicals, septic tanks, industrial sources, stormwater runoff, and disposal sites.

Groundwater quality problems in DEID include DBCP and nitrates. The problems are thought to generally be widespread, but no groundwater quality maps are available. However, groundwater in the District is generally of excellent quality for agricultural use and migration of contaminated groundwater is not a present concern. Groundwater quality in the District generally improves with depth as most of the present contamination problems occur in an upper mixing zone due to recharge and pumping cycles.

Nevertheless, the District recognizes that migration of contaminated groundwater is always possible. The District will continue to review groundwater quality data from other sources and remain cognizant of the possibility of contaminated groundwater migration into DEID.

Existing Activities

- Regularly review data and reports from regulatory agencies on contaminant plumes to provide warning of potential future problems.

Planned Actions

- Seek to locate recharge basins next to areas with water quality problems to blend water supplies and create a hydraulic barrier to impede movement of contaminant plumes.

6.5 - Groundwater Quality Protection

The District's surface water allocations cannot support their crop demand alone, and some groundwater will always be necessary. The groundwater, however, will have limited or no use if it has poor quality. Therefore, protecting the quality of the groundwater is a cardinal component of this GMP. Groundwater quality can be protected through proper use of pesticides, herbicides and fertilizers, stormwater quality management, septic system management, and water vulnerability planning and management. Some of these tasks are the responsibility of cities and communities, but DEID will support their efforts whenever possible.

Existing Activities

- Surface-water quality monitoring as part of the Southern San Joaquin Water Quality Coalition.
- Educate growers on the proper use of pesticides, herbicides and fertilizers in the District newsletter.

Planned Actions

- Seek funding to improve security at DEID water facilities and reduce the potential for contamination from acts of vandalism or terrorism.

7 - GROUNDWATER SUSTAINABILITY

Groundwater comprises about 25% of the water used in DEID in a typical year, but can comprise up to 80% of water supplies in a drought. During years with low surface water allocations, groundwater is essential to prevent the loss of permanent crops. In addition, some water users rely entirely on groundwater and do not use any surface water. Therefore, preserving the sustainability of groundwater is essential for the economic well being of the District and its growers.

Groundwater levels declined rapidly in DEID during the early 1900's (see **Attachment 6**). Groundwater levels began rising after DEID secured a CVP surface water contract in 1950. Since then, groundwater levels have risen almost 100 feet and are now fairly stable, but they do vary during wet and dry periods. A decline in groundwater levels would reduce groundwater reserves, increase pumping lifts, and could require deepening or abandonment of wells. Therefore, maintaining these stable groundwater levels is a high priority for DEID.

7.1 - Issues Impacting Groundwater Sustainability

Issues of concern for groundwater sustainability in DEID are discussed below:

San Joaquin River Settlement

The San Joaquin River Settlement will reduce CVP water supplies for DEID. One estimate shows that deliveries would be reduced by an average of 6,000 AF/year of Class I water and 7,000 AF/year of Class II water. However, total losses could be as high as 24,000 AF/year through sustained drought years. This would represent about 16% of the District's total water demands. DEID has a goal of fully recovering from these lower deliveries through water management programs, especially groundwater recharge and banking.

Surface Storage

Millerton Lake provides the primary surface storage element for the Friant Unit of the Central Valley Project (CVP). Although Millerton Lake has a maximum storage capacity of 520,000 AF, only 385,000 AF of storage is usable due to the outlet elevations into the Friant-Kern and Madera Canals. Millerton Lake lacks sufficient carry-over storage capacity to balance the wet and dry year needs for conservation storage. Studies are being performed to evaluate the merits of adding more storage dams on the San Joaquin River.

Excess Lands

Approximately 10 percent of the lands in DEID are ineligible to receive CVP water due to the amount of land held by one owner that is being irrigated with CVP water. These are referred to as 'excess lands' or 'ineligible lands'. **Attachment 9** shows the location of excess lands in DEID. (It is important to note that the locations of these lands

changes from year to year as land ownership changes). These lands comprise about 10% (~6,000 AF) of the District. These lands primarily use groundwater and therefore cause stress on the District's groundwater reserves. As a result, securing surface water for these lands is a high priority for DEID. DEID has successfully secured some surface water for the excess lands, but in general they still use more groundwater per acre than other lands. According to P&P (2006), the excess lands have a demand of 19,500 AF/year, but surface water deliveries to them have averaged only 3,300 AF/year.

The DEID distribution system has the capacity to deliver full water demands to all excess lands. As a result, whenever possible, DEID has purchased or exchanged for other non-CVP water sources to deliver to the excess lands. Water that is recharged and later extracted can currently also be delivered to excess lands, and is one reason DEID is evaluating recharge and banking projects.

7.2 - Overdraft Mitigation

Groundwater overdraft was a concern in the early 1900's, which was one of the reasons the District sought a CVP contract for surface water. Since then groundwater levels have gradually risen and are now fairly stable. However, continued proper management is needed to maintain these stable groundwater levels, and, if possible, continue to raise groundwater levels. Moreover, the District is concerned that reductions in surface water supply as a result of the San Joaquin River Restoration may lead to groundwater overdraft.

Groundwater recharge can help reduce overdraft and is discussed in Section 7.3. The following groundwater management policies are also followed to help reduce groundwater overdraft:

Limitations on Pumping

The California Water Code gives water and irrigation districts the power to limit or suspend groundwater extractions. However, such limits will only be implemented if the District determines through study and investigation that groundwater replenishment programs, or other alternative sources of water supply, have proved insufficient or infeasible to lessen impacts to groundwater. In the unlikely event that it becomes necessary to reduce groundwater extractions, the District intends to accomplish such reductions under a voluntary program, which would include suitable incentives to compensate users for reducing their groundwater pumping. The District will not attempt to restrict or otherwise interfere with any landowner or water user exercising a valid right to pump and utilize groundwater.

Limitations on the Exportation of Water Supplies

The District generally does not support groundwater pumping for export out of the District unless it involves a transfer or exchange of water that will not reduce the total water supply available to the District. In addition, the District usually opposes surface water transfers that are accompanied with increased groundwater pumping

used to replace the transferred surface water. However, such transfers will be reviewed on a case-by-case basis and will be permitted if they are approved by the Board of Directors.

Economic Inducements

The District recognizes that management of water supplies should reflect water conservation and the protection of groundwater resources. The District currently provides an indirect economic inducement by establishing water rates high enough to promote water conservation yet low enough to compete with groundwater pumping costs. This pricing system encourages the use of surface water to meet irrigation demands when available, thereby preserving the underlying groundwater resource.

Pumping Well Interference from Adjacent Properties

A significant cause of overdraft in many Districts in the San Joaquin Valley is pumping by adjacent landowners. This occurs when water users in a district pump groundwater and the extraction well's capture zone entrains groundwater from a neighboring district. This phenomenon, called pumping well interference, is currently a problem between the District and neighboring agencies. Groundwater mining has historically occurred on DEID's northwestern boundary from the groundwater pumping that occurs within Pixley Irrigation District, and on DEID's southeastern boundary from the pumping activities within the Kern-Tulare Water District. It is recognized that pumping well interference will continue to be prevalent unless groundwater conditions and pumping patterns change appreciably within these neighboring districts. Therefore, pumping well interference will be evaluated in each Annual Groundwater Report. The impact that pumping well interference is having on water levels and well yields in the District will be evaluated through a capture zone analysis that will establish the extent of the problem. DEID will continue to meet with all parties involved to discuss alternatives for resolving the problem.

Existing Activities

- Restrict groundwater exports from the District.
- Set surface water rates low enough to be competitive with groundwater pumping costs.

Planned Actions

- Evaluate annual groundwater contour maps for evidence of pumping well interference from neighboring agencies.

7.3 - Groundwater Replenishment

The natural and artificial forms of groundwater replenishment in DEID are discussed below:

Streambed infiltration. Substantial groundwater replenishment is possible in the White River, but the River only flows about one in every ten years into DEID.

Deep percolation from precipitation. In DEID, deep percolation from normal rainfall events is probably negligible. Some deep percolation occurs during exceptionally long and heavy storms. However, such storms are infrequent. USBR (June 1950) estimated rainfall deep percolation in DEID to average 1,000 AF/year, or less than 1% of the District water demands.

Artificial recharge. Between 1993 and 2004, DEID recharged an average of 2,500 AF/year, with annual volumes ranging from 0 to 6,300 AF. DEID would like to recharge more surface water, but the high cost of the water typically makes recharge uneconomical.

The District has generally used flood water from the Friant CVP or other local rivers for groundwater recharge. Unfortunately, the White River has a high bed load, and, as a result, the District does not use it for irrigation or intentional recharge because it plugs their recharge basins and deposits silt in their distribution system. The River also has flash flood characteristics and it is difficult to capture large quantities of water.

In 1993, the District purchased an 80-acre parcel specifically for development into a groundwater recharge basin. This new site has been fully developed for groundwater recharge purposes, with five separate cells, and dual methods of introducing water to each cell, either from the District's distribution system or from direct diversions out of White River. The site is located next to the White River (see **Attachment 2**) and is called the Turnipseed Groundwater Recharge Basin. The District also has another 5 acre recharge basin near Highway 99.

DEID is exploring the option of expanding the Turnipseed Groundwater Recharge Basin. The basin could be expanded to about 400 acres with a desired recharge capacity of 20,000 AF/year. A feasibility study on this proposed expansion began in 2007 and is expected to be finished in 2008.

In general, the areas near the present and ancestral channels of the major streams (such as White River) have higher permeability than other areas. Refer to Section 2 for discussions on geologic factors that influence groundwater recharge in DEID.

Groundwater banking. Groundwater banking agreements often require that a portion of the banked water be left in the aquifer as a payment to the banking agency. If DEID established a groundwater banking program they would also require that some water be left in their aquifer, and thus groundwater banking could help to partially replenish groundwater supplies.

In-lieu deliveries. The District views in-lieu deliveries as the most practical and effective means of groundwater replenishment. In-lieu deliveries, also called indirect

deliveries, involve the delivery of surface water to landowners and water users who would otherwise have pumped groundwater, thus leaving water in the aquifer for future use. With the importation of around 120,000 AF of surface water annually, DEID is performing a significant amount of in-lieu recharge.

Deep percolation from irrigation. Deep percolation occurs when some of the water applied for irrigation percolates beyond the crop root zone and accumulates in the aquifer. The extent of deep percolation varies with the irrigation method, irrigation efficiency, and antecedent moisture condition.

Seepage from distribution facilities. The District's entire distribution system is pipelined. Therefore, seepage losses are small and probably represent less than 1% of total water deliveries, but may be higher in pipeline sections that are in poor condition. The seepage flows directly to the groundwater and therefore is not considered a true loss.

Existing Activities

- Groundwater recharge in 85 acres of existing recharge basins.
- Performing a study to evaluate the feasibility of expanding the 80-acre Turnipseed Groundwater Recharge Basin.
- Measure the volume of water delivered to groundwater recharge basins.
- Periodically remove sediment and rip the soils in recharge basins to maintain recharge rates.

Planned Actions

- Work cooperatively to minimize development on lands that are favorable for artificial recharge.
- Increase groundwater recharge capabilities in the District.

7.4 - Conjunctive Use of Water Resources

Conjunctive use of water is defined as the coordinated use of both subsurface and surface water sources so that the combination will result in optimum benefits. Recognizing that in some years the District cannot supply their total water demands, most water users also have private groundwater wells. Therefore, landowners in the District practice their own conjunctive use because of necessity.

The District does not operate any groundwater wells but does perform groundwater recharge and thus also practices conjunctive use. DEID has considered installing extraction wells to supplement their surface water supply. The wells would be larger and probably more economical to construct and operate than smaller grower wells.

Since there has not been a dry year in several years, some local growers may have a false sense of security, and believe that DEID can provide a firm and reliable water

supply every year. Currently this is not possible, but the District would like to achieve this through groundwater recharge and banking projects. Accordingly, when determined practical and appropriate, the policies below will be followed to encourage and facilitate conjunctive use of the District's water resources:

Transfers to Districts within the Same Groundwater Basin

In above-normal water years, DEID has transferred surplus CVP contract water to neighboring districts that share the same groundwater basin. This is done since a reduction in pumping in the neighboring districts has a beneficial impact on DEID groundwater levels. These transfers are performed primarily with Kern-Tulare/Rag Gulch Water Districts, and with Lower Tule River Irrigation District (LTRID) for the benefit of Pixley Irrigation District.

Exchanges for Non-Project Water to Serve Excess Lands

In above normal water years, DEID has exchanged surplus CVP contract water for non-project water so the water can be delivered to lands that are ineligible to receive Central Valley Project water under Reclamation law (excess lands). This reduces pumping on the excess lands and helps to preserve groundwater levels.

Regional Conjunctive Use Projects

Existing conjunctive use operations can be expanded by adding interconnections and promoting water supply exchanges between districts that allow for more flexibility in the region's water supply. The region's assets of federal, state, and local water supplies, dewatered groundwater storage, and significant irrigation demand make it an ideal location to regulate surface supplies conjunctively.

The region must absorb wet year water supplies in order to maintain a reliable and economical water supply. Wet-year water is available on short notice and not always at times when the water can be delivered for an irrigation demand. Therefore, it is important that the Region work cooperatively to increase its ability to absorb surface water when available. The Poso Creek Group is actively identifying conjunctive use projects that could benefit DEID (see Section 4.2).

Existing Activities

- DEID and Pixley ID are jointly pursuing a Groundwater Banking Reconnaissance Study to investigate the feasibility of banking surplus waters from DEID in Pixley ID during wet years (likely delivering the water to growers as in-lieu recharge), and returning a similar quantity of water to DEID in dry years from Pixley ID's banked reserves. The project is currently envisioned to be able to deliver between 10,000 AF and 30,000 AF of water to DEID in a dry year. The reconnaissance study is expected to be completed in mid-2007.
- Groundwater banking with North Kern Water Storage District. DEID has an agreement that was executed in 2006 that allows for the banking of up to 30,000 acre-feet in North Kern Water Storage District (North Kern) for later return to DEID.

During the 2006 water year (March 2006 through February 2007) DEID banked 29,562 acre-feet of water with North Kern. After applying an agreed-to loss factor of ten percent, North Kern credited DEID with 26,6065 acre-feet of water for later return.

- Pursue water management programs with other entities, including local Districts, to provide non-project water to the District for delivery to eligible and/or excess lands.
- Support and facilitate the delivery of imported water supplies to Kern-Tulare and Rag Gulch Water Districts (located to the southeast) and the Pixley Irrigation District (located to the northwest) for the purposes of reducing groundwater migration out of the District.

Planned Actions

- Support the development of new surface storage and water supply projects that would permit the participants to better utilize surface water supplies.
- Investigate additional groundwater banking projects and facilities.

7.5 - Water Conservation and Education

The District considers water conservation and education important aspects of their overall groundwater management efforts. The District's *2005 Agricultural Water Policy* states:

"District water must be put to reasonable and beneficial use. The District will refuse to continue water deliveries if water is used excessively, wastefully or otherwise in an imprudent manner."

Most District growers use water in a responsible and efficient manner. In addition, many of the District's growers conserve water through the use of highly efficient drip, micro-jet, and micro-sprinkler irrigation system technology.

All water deliveries are metered and billed based on the volume used. Therefore, all customers have an incentive to minimize water usage. In addition, the District's distribution system is entirely pipelined. The system allows the District to make water deliveries with very low losses. Despite all these water conservation achievements, DEID still provides on-going water conservation education to its growers.

Existing Activities

- The District supports the following organizations and events that promote water conservation and publish educational materials on water conservation: Association of California Water Agencies, California Farm Water Coalition, Water Education Foundation, Friant Water Users Authority, Agriculture in the Class Room, and the Kern County Farm Day.
- For the convenience of water users that may seek such services, the District maintains a list of individuals and agencies that provide on-farm water conservation and management assistance.

- The District encourages water users to use crop ET data as part of their water management plan. The District installed a weather station at its headquarters that provides daily weather information, including ET. The data is available on the DWR website.
- Monthly water statements include water use information for each customer. In addition, the District maintains historic water use by turnout. This data is available to water users on request as it could be beneficial in making on-farm water management decisions.
- The District publishes a quarterly newsletter to help educate local growers on important issues such as water conservation and water quality protection.

Planned Actions

- When available, provide information on groundwater quality versus depth to growers so they can use it when designing and installing wells.

7.6 - Water Recycling

DEID does not presently use recycled water (also called reclaimed water or wastewater effluent) from any nearby municipalities. The City of Delano is located just south of DEID and the community of Earlimart is an urban enclave located in the northwest portion of DEID. Both Delano and Earlimart have wastewater treatment plants and send the effluent to percolation ponds. Both wastewater treatment plants are located at the western edge of DEID, and reclaimed water would have to be pumped uphill to serve DEID growers, making its use impractical. However, the current practice of percolation does benefit the regional groundwater levels. The City of Delano has been considering the construction of a gravity pipeline to send their effluent to Alpaugh Irrigation District, located about 8 miles west of DEID. DEID would be open to using reclaimed water for irrigation if a practical supply became available.

Existing Activities

None

Planned Actions

- Remain cognizant of opportunities to purchase recycled water from other municipalities.

8 - GROUNDWATER OPERATIONS

8.1 - Well Construction Policies

The District owns one monitoring well at the Turnipseed Recharge Basin, and one domestic well that provides water to the District office. The District does not presently own or operate any agricultural extraction wells, however, they may be constructing wells in the near future as part of groundwater recharge projects.

Proper well construction is important to ensure reliability, longevity, and protection of groundwater resources from contamination. Department of Water Resources Bulletin 74-81 provides useful guidelines for the construction of groundwater wells. Proper wellhead protection is essential to ensure that contaminants do not inadvertently enter a well. Well construction policies that are intended to ensure proper wellhead protection are discussed in Section 6.2 – Wellhead Protection.

In addition, the following quality assurance procedures will be followed when constructing District owned wells. Landowners are also encouraged to follow these procedures when constructing private wells:

1. Well construction will be performed under contract by a licensed and experienced well driller, in accordance with specifications prepared by a licensed engineer or geologist, and reviewed by legal counsel.
2. A licensed engineer or geologist will oversee construction of the wells.
3. A licensed land surveyor in the State of California will oversee survey of any newly constructed wells.
4. Construct wells according to guidelines in DWR Bulletin 74-81.

Existing Activities

None

Planned Actions

- Construct wells according to DWR Bulletin 74-81.
- Construct wells using qualified and licensed contractors, engineers, geologists and land surveyors.

8.2 - Operation of Facilities

The District operates two groundwater recharge basins. The District also owns one monitoring well at the Turnipseed Recharge Basin, and one domestic well that provides water to the District office. In the future, DEID expects to construct more recharge and banking facilities, monitoring wells, and extraction wells. Proper construction, operation, and maintenance of these groundwater facilities is an important part of groundwater management.

DEID will also strive to provide the best facilities for delivery of surface water supplies, since they are used conjunctively with groundwater. DEID realizes that the success of conjunctive-use programs is often contingent on the quality of surface water conveyance systems. If extraction wells are constructed then the distribution system may need local upgrades to allow delivery of the pumped groundwater to growers.

Existing Activities

- Feasibility study for expansion of Turnipseed Groundwater Recharge Basin (see Section 7.3).
- Feasibility study for joint groundwater banking study between Pixley ID and DEID (see Section 7.4).
- Maintenance and upgrading of conveyance facilities for capacity and stability.
- Maintenance of recharge facilities including de-vegetation, disking, deep ripping, and de-silting, as necessary to improve recharge potential.

Planned Actions

None

9 - GROUNDWATER PLANNING AND MANAGEMENT

9.1 - Land Use Planning

The intent of this Plan is not to dictate land-use planning policies, but rather to establish some land-use planning goals that can aid in protecting and preserving groundwater resources. DEID does not have direct land-use planning authority. However, DEID does have the opportunity to comment on environmental documents for land-use related activities. DEID will attempt to work cooperatively with other agencies to minimize adverse impacts to groundwater supplies and quality as a result of proposed land-use changes. Some specific land-use planning goals include: (1) preserving areas with high groundwater recharge potential for recharge activities; (2) protecting areas sensitive to groundwater contamination; (3) requiring hydrogeologic investigations, water master plans, and proven and sustainable water supplies for all new developments; and (4) requiring appropriate mitigation for any adverse impacts that land use changes have on groundwater resources.

Existing Activities

- Notify residents and agencies of projects that have the potential to impact groundwater within their sphere of influence.
- When appropriate, comment on environmental documents and land-use plans that have the potential to impact groundwater.

Planned Actions

None

9.2 - Groundwater Reports

The District has a goal to prepare groundwater reports every year to document groundwater levels, available groundwater storage, historical trends, and other important groundwater related topics. This information will be used to forecast future problems, plan future groundwater projects, and develop new groundwater policies. The annual report will cover the prior calendar year and will be completed each year by April 30th. See **Attachment 10** for a report outline.

Existing Activities

- DEID prepares a Water Management Plan every five years for the United States Bureau of Reclamation as a requirement to maintain their Central Valley Project water supply. The Water Management Plan includes sections on groundwater usage and groundwater projects.

Planned Actions

Prepare an annual Groundwater Report that will include the following:

1. Groundwater level data;

2. Groundwater contour maps and groundwater flow directions;
3. Groundwater storage calculations;
4. Evaluation of one-year and five-year historical trends in groundwater levels, contours, and storage, and perceived reasons for any changes;
5. Estimates of deliveries to recharge basins;
6. Summary of important groundwater management actions;
7. Discussion on whether management actions are meeting the management objectives;
8. Summary of proposed management actions for the future;
9. Summary of groundwater related actions taken by other regional groups;
10. Recommendations for changes in the content or format of the annual report;
11. Recommendations for updates to the GMP.

9.3 - Plan Implementation

Implementation of this updated GMP is expected to result in significant amounts of new knowledge and an achievable improvement in groundwater management in DEID. **Attachment 11** includes an implementation schedule for this GMP from 2007-2012. The schedule does not include existing activities that will be continued. DEID will maintain all existing programs unless stated otherwise in this GMP. In addition, the schedule does not include proposed actions that are new policies or guidelines, which will be implemented on a continuous basis. Rather, the schedule only includes new tasks and projects.

9.4 - Plan Re-evaluation

The Groundwater Advisory Committee will be responsible for monitoring the progress in implementing the GMP objectives. Refer to Section 4.1 for more information on the membership, policies, and procedures of the Committee. The Committee will attempt to meet at least once a year to review and evaluate groundwater conditions as well as evaluate the effectiveness of the GMP. As new policies, practices, and ordinances become necessary or desirable to enhance the management of the District's groundwater supply, this Plan will be amended as necessary.

Existing Activities

None

Planned Actions

- Update the GMP at least every five years, or more frequently if deemed appropriate.
- Evaluate the effectiveness of the GMP and need for an update at the annual Groundwater Advisory Committee meetings.
- Document recommendations for improving or updating the GMP in each annual Groundwater Report.

9.5 - Dispute Resolution

No groundwater disputes have occurred in DEID in recent years. However, the following procedures are in place to address conflicts if they do occur:

1. Discuss the dispute with the operations supervisor.
2. If the dispute cannot be resolved with the operations supervisor, or it concerns an issue that goes beyond operation and maintenance, then contact the District Manager to discuss the issue.
3. If the issue cannot be resolved by the District Manager, the District Manager will refer the dispute to the Board of Directors with a recommended resolution, unless the issue is outside the authority of the Board.

If necessary, the District Manager may use legal counsel or technical staff to assist in addressing disputes.

Existing Activities

- Resolve disputes through the District's general dispute resolution procedures.

Planned Actions

- Discuss issues of concern at the annual GAC meetings in an effort to prevent future disputes.

9.6 - Program Funding and Fees

Several alternatives are available to DEID for funding groundwater projects, and are described below:

Water Replenishment Fees

Under AB3030, local agencies have the authority to limit groundwater extractions and implement water replenishment fees based upon the amount of water extracted (extraction based fees must first be approved by majority vote of impacted landowners). Inherent in these powers is the authority to implement metering of private wells. These are considered measures of last resort and DEID will make any and all efforts to ensure the private, non-metered use of groundwater by the local growers.

Capital Improvement Fees

The District has the authority to finance capital improvement projects and collect repayment charges from the benefited parties. This process would require a favorable vote from the constituency, and is considered a realistic alternative for large capital projects, such as groundwater recharge or banking projects.

Grants and Loans

The District will pursue available grants and low-interest loans from the Department of Water Resources as well as other State and Federal agencies. The District

realizes that funding from State and Federal agencies for groundwater projects will be partially based on their progress in implementing this GMP.

Other Revenue Sources

Groundwater projects can also be financed through water user fees and assessments that are collected regularly from all district landowners.

Exiting Activities

- Regularly research grant and loan opportunities from the State and Federal government.

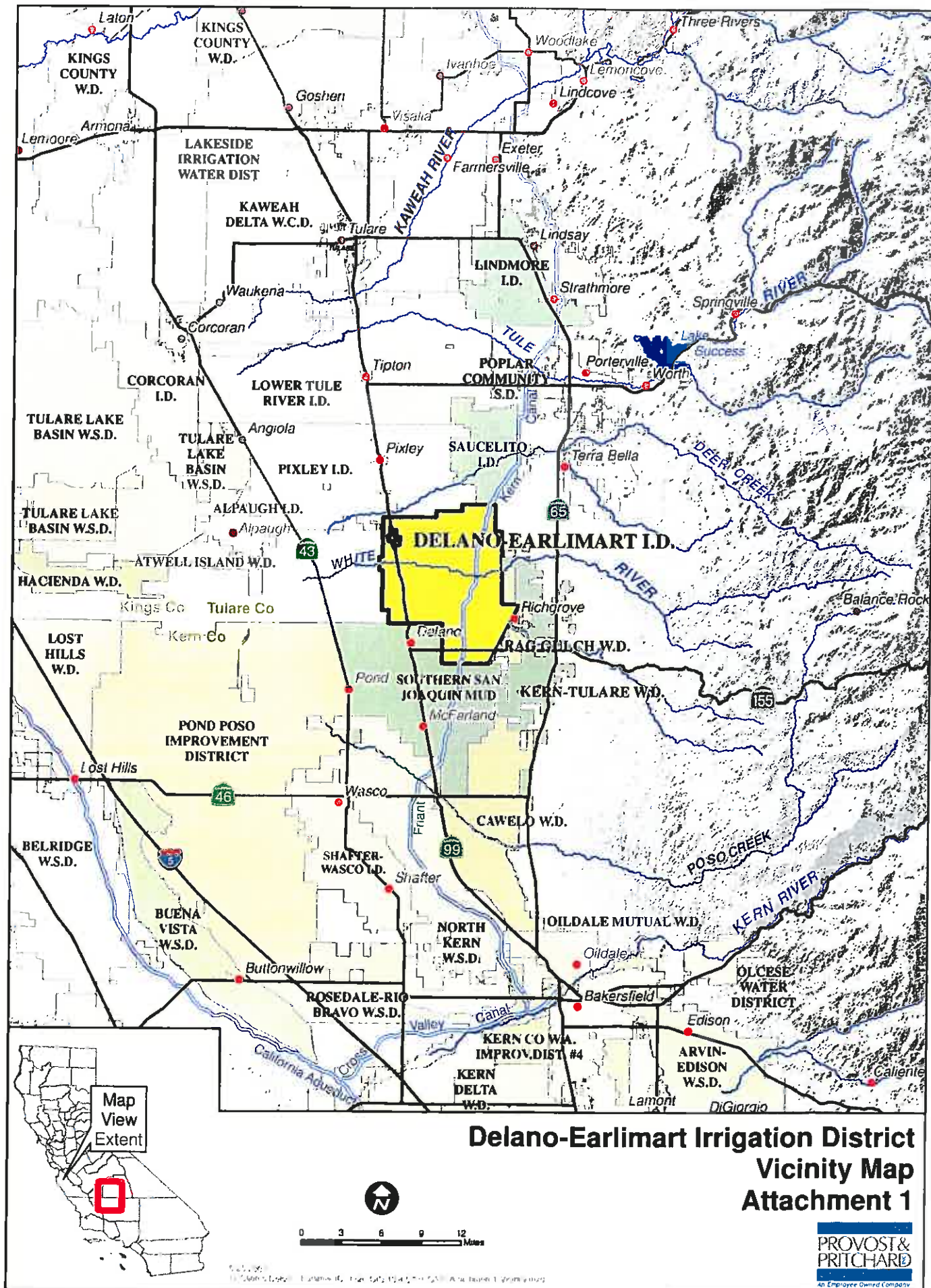
Planned Actions

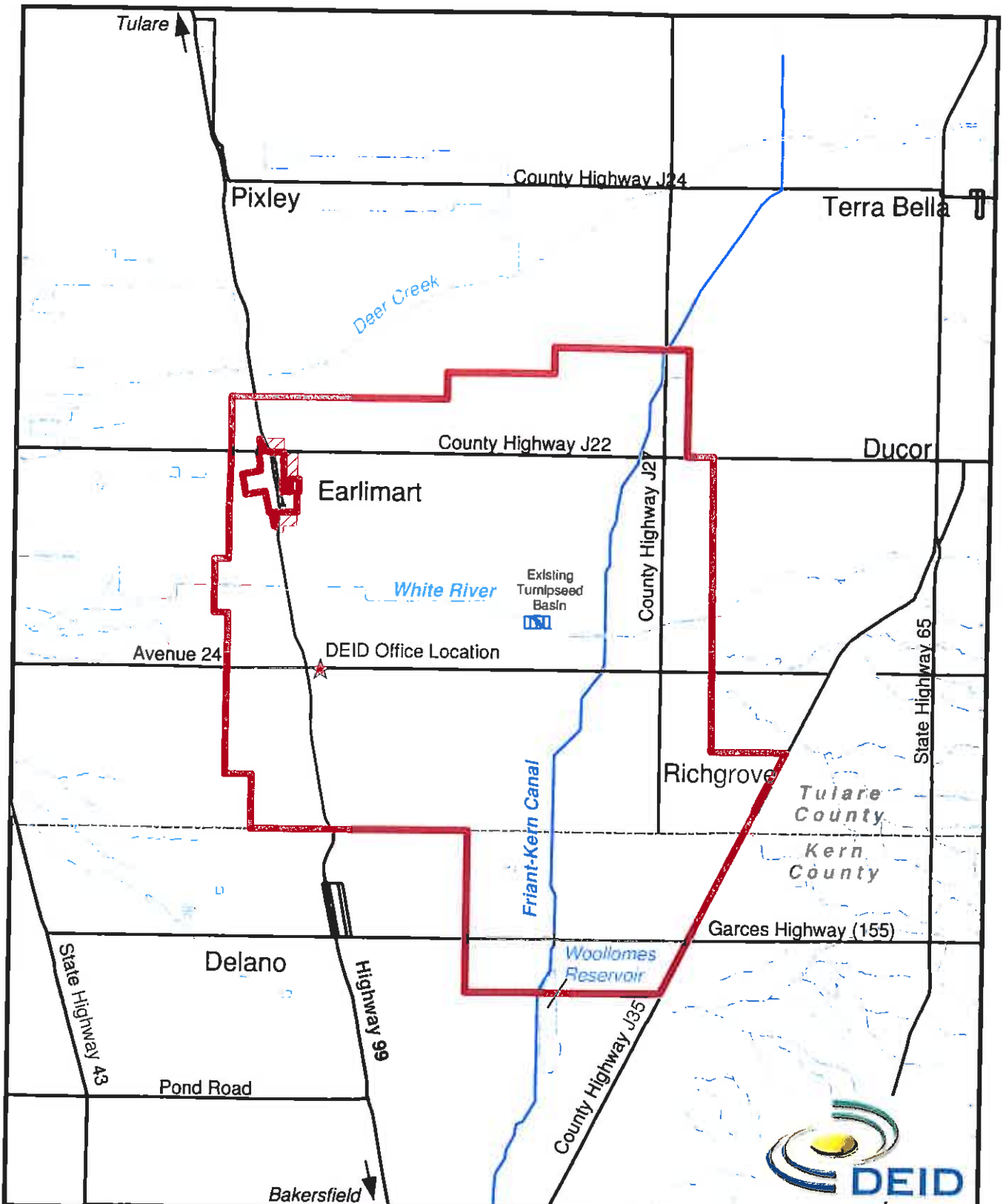
- Identify beneficial groundwater projects that become economically feasible when costs are shared among two or more participants. This will be done primarily through the Poso Creek Group.

16. Provost & Pritchard Engineering Group, Inc., *Draft Investigations of Changed Water Sources, A Study for Delano-Earlimart Irrigation District and the Metropolitan Water District of Southern California*, December 2006.
17. Provost & Pritchard Engineering Group, Inc., *Pixley Irrigation District and Delano-Earlimart Irrigation District Draft Reconnaissance Study on a Joint Groundwater Bank within Pixley Irrigation District*, 2007.
18. Thomson West, *California Water Code, 2003 Desktop Edition, Chapter 3 – Groundwater Management Plans*, 2003.
19. United States Bureau of Reclamation, *Factual Report, Delano-Earlimart Irrigation District*, June 1950.
20. United States Bureau of Reclamation, *Geology, Hydrology and Water Quality in the Terra Bella – Lost Hills Area*, 1963.
21. United States Bureau of Reclamation, *Technical Studies in Support of Factual Report, Delano-Earlimart Irrigation District*, December 1950.
22. Zhou, Q., Bear, J., and Bensabat, J., *Saltwater Upconing and Decay Beneath a Well Pumping above an Interface Zone*, Lawrence Berkeley National Laboratory, University of California, Paper LBNL 55486, 2004.

**DELANO-EARLIMART IRRIGATION DISTRICT
GROUNDWATER MANAGEMENT PLAN**

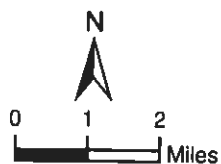
ATTACHMENTS





Legend

- County Boundary
- Detachments
- DEID Boundary
- Highway
- River/Canal



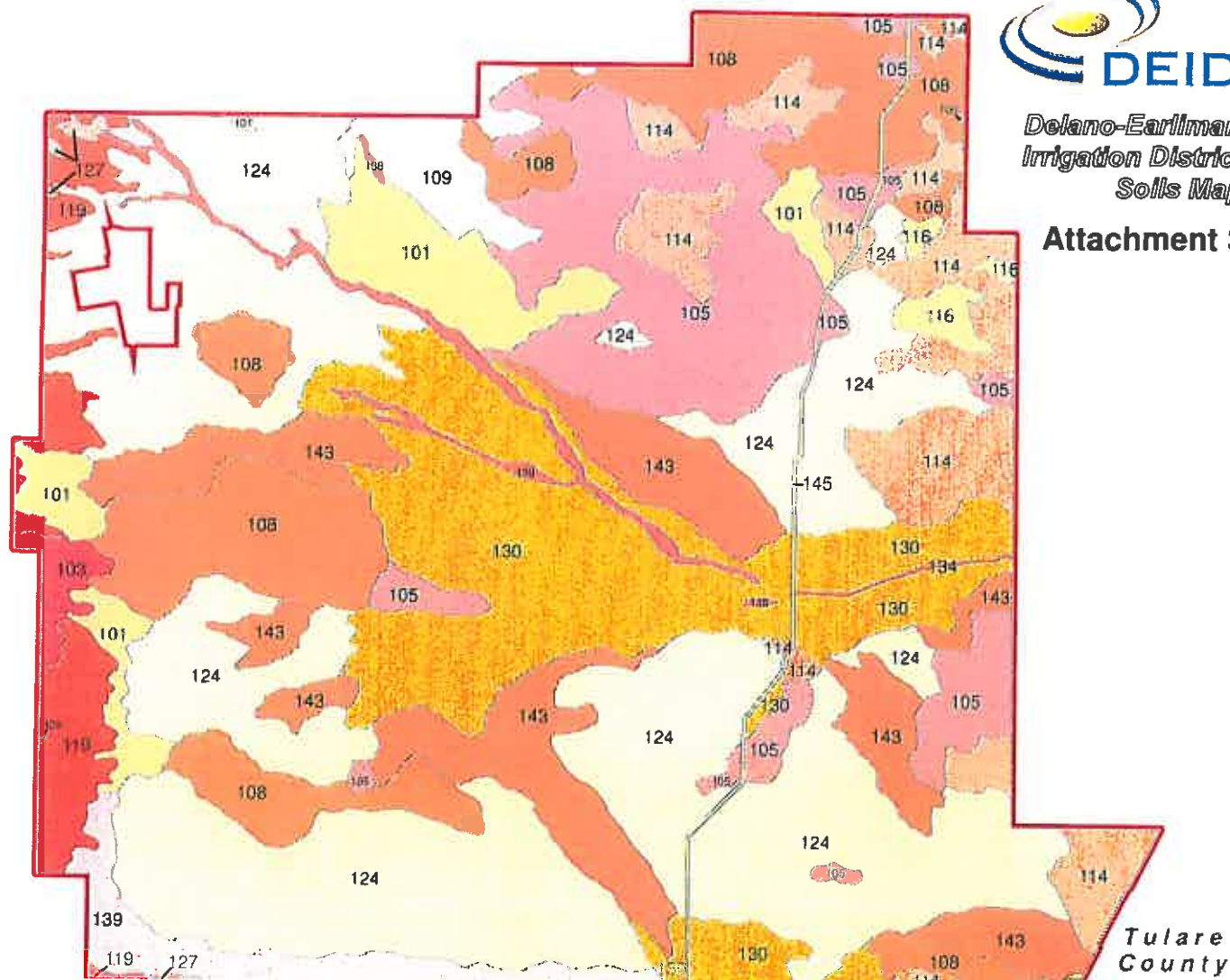
**Delano-Earlimart
Irrigation District
Location Map
Attachment 2**





**Delano-Earlimart
Irrigation District
Soils Map**

Attachment 3



Tulare County

Kern County

Legend

- County Boundary
- Detachments
- DEID Boundary

Soils

Tulare County (Black) / Kern County (Brown)

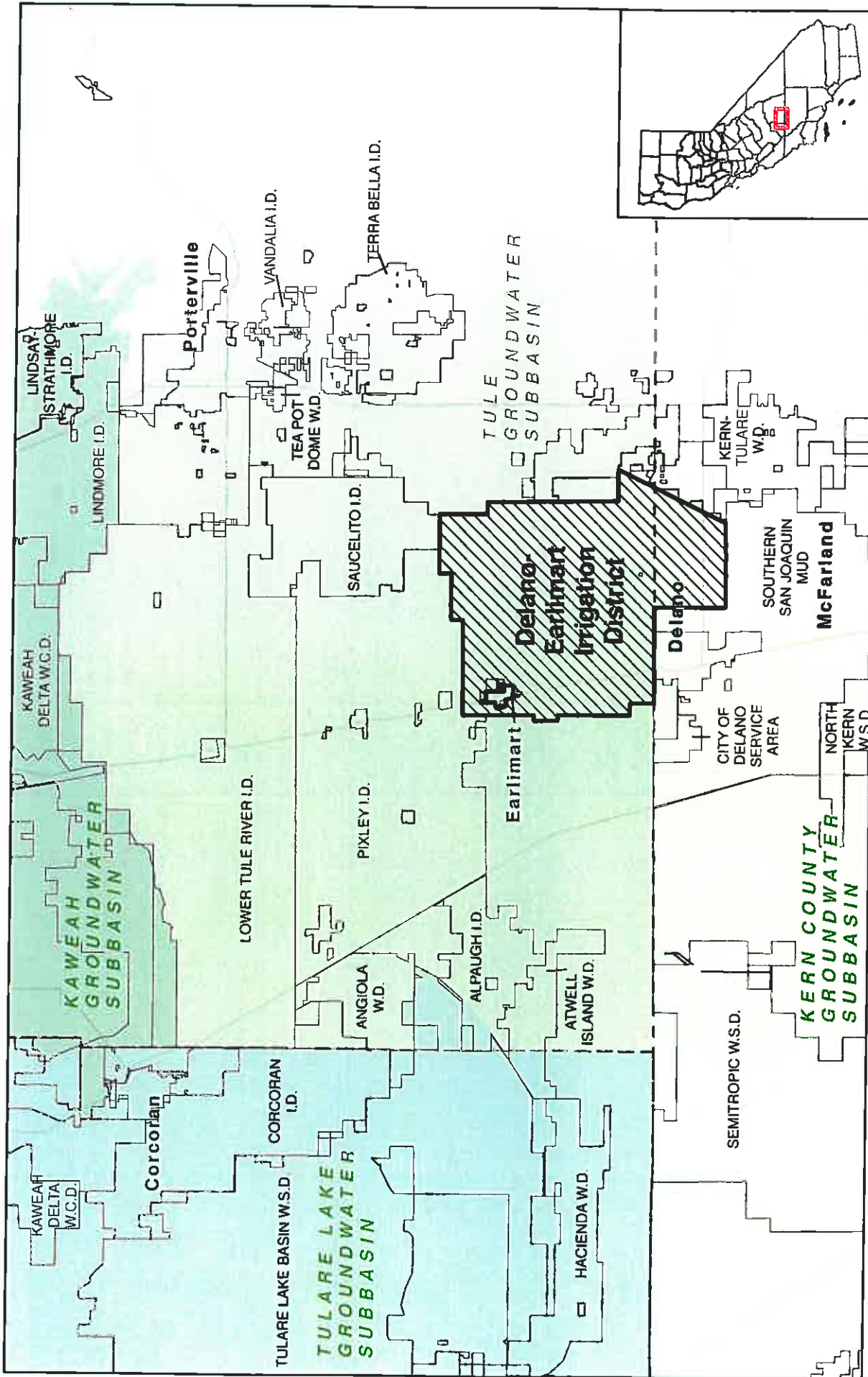
- 101 AKERS-AKERS, SALINE-SODIC, COMPLEX, 0-2%
- 103 ATESH-JERRYSLU ASSOCIATION, 0-2%
- 105 CALGRO-CALGRO, SALINE-SODIC, COMPLEX, 0-2%
- 106 CENTERVILLE CLAY, 0-2%
- 108 COLPIEN LOAM, 0-2%
- 109 CROSSCREEK-KAI ASSOCIATION, 0-2%
- 114 EXETER LOAM, 0-2%
- 116 FLAMEN LOAM, 0-2%
- 119 GARECK-GARCES ASSOCIATION, 0-2%
- 124 HANFORD SANDY LOAM, 0-2%
- 125 CAJON LOAMY SAND, 0-2%
- 127 KIMBERLINA FINE SANDY LOAM, 0-2%
- 130 NORD FINE SANDY LOAM, 0-2%
- 134 RIVERWASH
- 138 TUJUNGA LOAMY SAND, 0-2%

- 139 WASCO SANDY LOAM, 0-2%
- 143 YETTEM SANDY LOAM, 0-2%
- 145 WATER-PERENNIAL
- 154 EXETER SANDY LOAM, 0-2%
- 155 EXETER SANDY LOAM, 2-9%
- 156 GARCES SILT LOAM
- 174 KIMBERLINA FINE SANDY LOAM, 0-2%
- 192 MCFARLAND LOAM
- 243 WASCO SANDY LOAM
- 257 WATER



0 0.5 1 Miles

Data Source: NRCS Soils Surveys,
Northwest Kern County, Western
Tulare County.

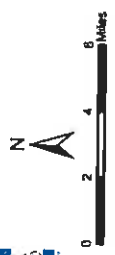


Attachment 4
Groundwater Basin Map
Delano-Earlimart Irrigation District

Groundwater Sub Basin

- KAWEAH
- KERN COUNTY
- TULARE LAKE
- TULE

Groundwater Sub Basins
 DWR 118-80
 (GIS Oct 2000)



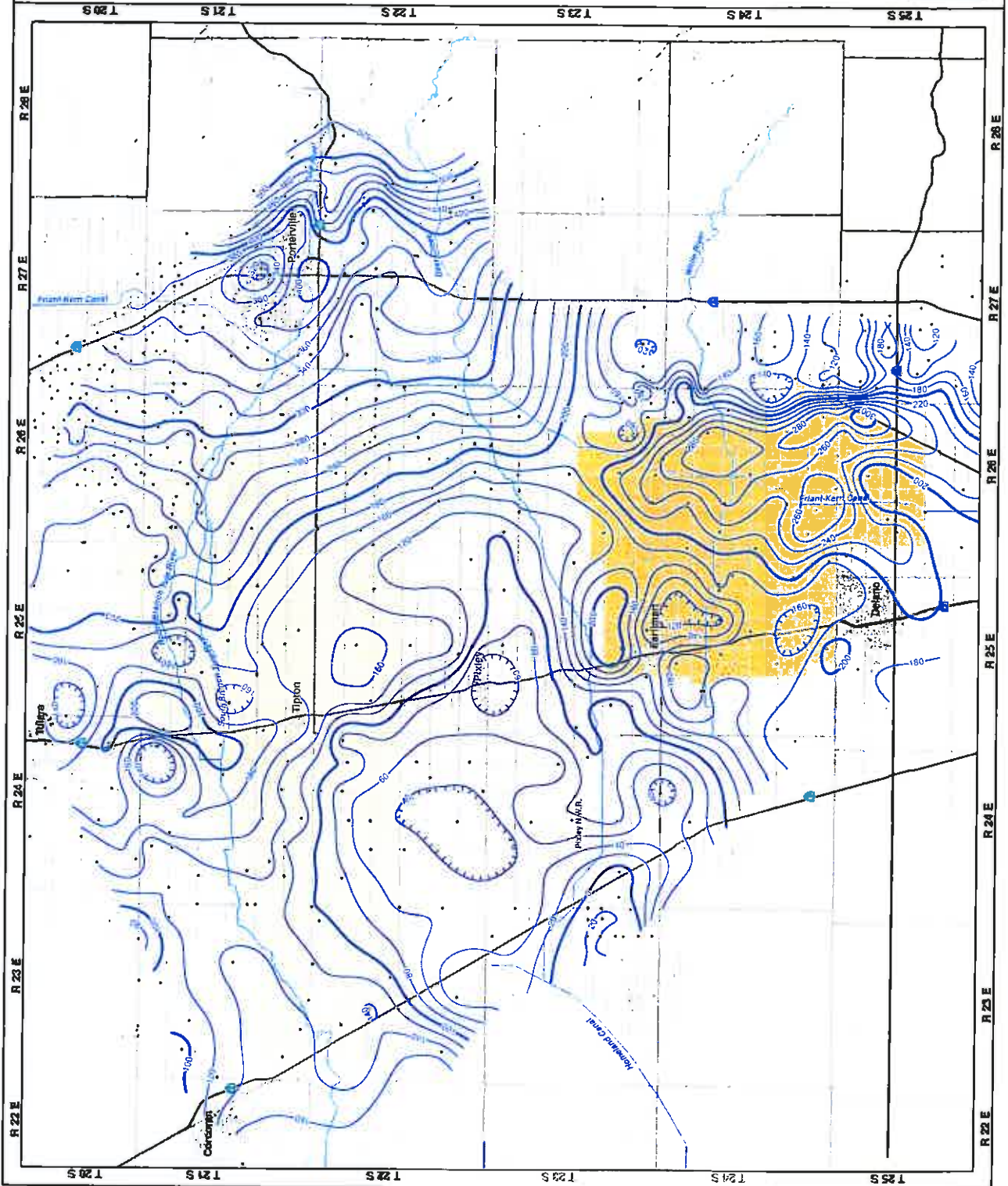
**Southern Tulare County:
Analysis of Historic
Well Water Levels**

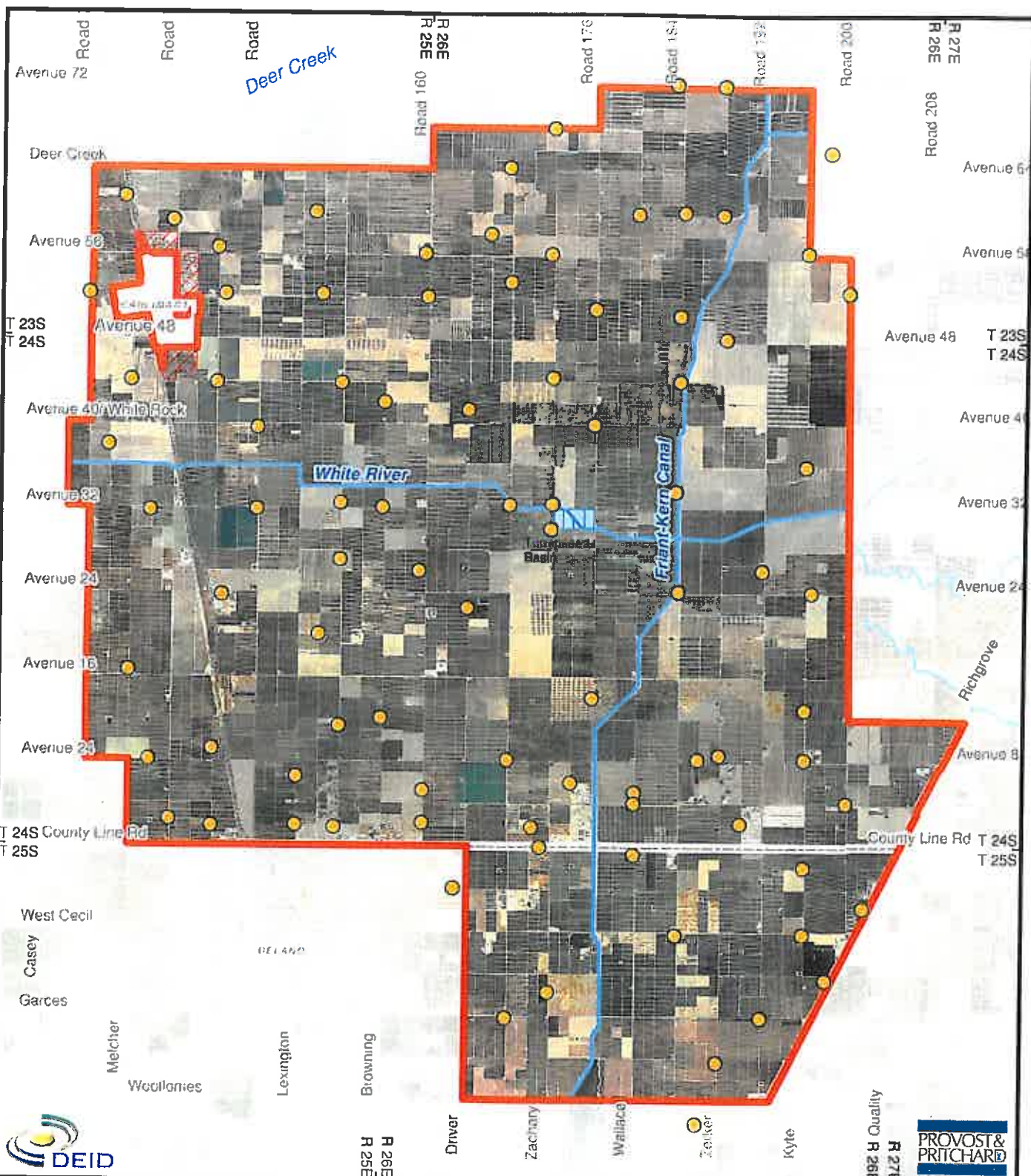
**Elevation of
Groundwater
Spring 2005**

Attachment 5

Legend

- Well Location
- Well Used in Analysis
- Elevation of Water in Wells (Feet Above Sea Level)
- Line of Equal Elevation (100 ft interval)
- Line of Equal Elevation (20 ft interval)
- Major Water Feature
- Canal / River
- Irrigation / Water District
- Delano Earleman I.D.
- Lower Tulare River I.D.
- Pringle I.D.
- Porterville I.D.
- Sauzeville I.D.
- Ted Pol Dome W.D.
- Vandale I.D.





Delano-Earlimart Irrigation District



- Legend**
- DEID Boundary
 - Monitored Wells
 - County Boundary
 - River/Canal

Monitor Well Location Map

Attachment 7

Delano-Earlimart Irrigation District

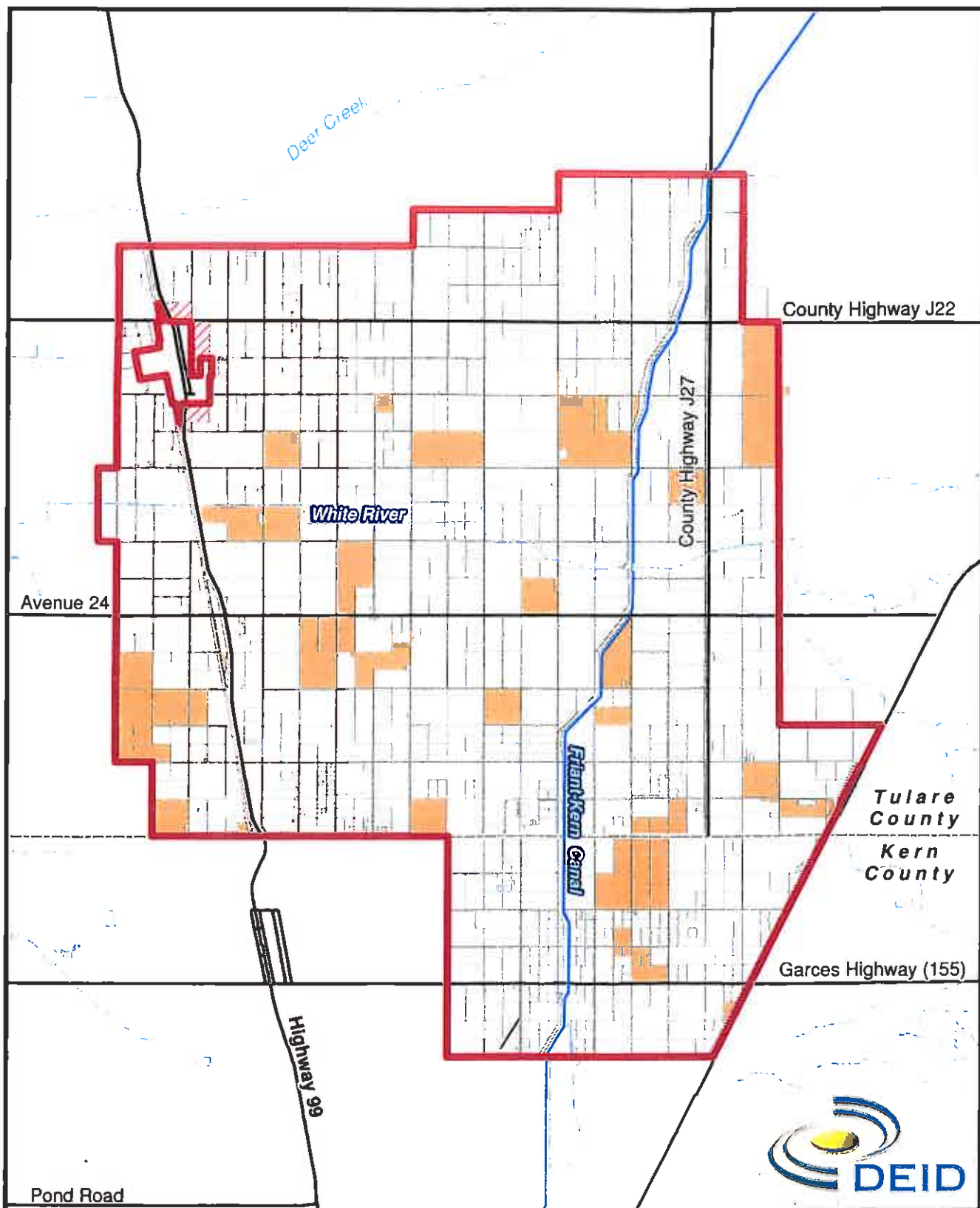
Monitoring Well Attributes

DEID Well No.	Township	Range	Section	Possible Section	Nearest Turnout	Notes
64	24	25	36	36h1	722	On Ave 160, 118.1w 2.0s - 0.2w' 200 yds south of T/O 722, abandoned well west of tank old shopyard. Bees
65	24	25	36h	36j1	723	Next to T/O 723 west side; 1/2 mile north of County line, westside of Rd 160
66	24	26	30c	30r1	710	Fenced and needs measure point. Wood collapsed around pump head.
67	24	26	32a	32g1		1/2 mile north of County line, west of Rd 176, after railroad tracks, inside yard next to large green tank (sub wel)
68	24	26	29		704	On Rd 176, north of Ave 8; next to T/O 704, no measure point
69	24	26	33		802	119.1e 04.4n - 0.5w; next to T/O 802 on west side. Bees
70	24	26	33	33p1	802	119.1e 04.4n 0.05w; 200 yds north of T/O 802; no measure point
71	24	26	27		834	75 NE of T/O 119.1e 1.4n - 1.2n. New well location: west of T/O 817, north of Ave 8, west of Rd 184 1/4 mile
72	24	26	27i	27h1	833	On Rd 188, north side of Ave 8, north of T/O 833. Domestic well.
73	24	26	26		867	119.1e 24n-1.0; 85' north of Ave 8, 1/2 mile east of Rd 192
74	24	26	26	26c2	619a	200 yds south of T/O 619a; 115.8e 2.0s - 0.3w; wire got stuck in 1 1/2" pipe
75	24	26	35b	35h3	885	NW corner of Ave 4 and Rd 200; west of T/O 885, submersible
76	25	26	2		870	119.1e 24s - 0.3w; south of County line, 1/4 mile west of Pandol Rd; next to T/O 870 on west side. Submersible
77	24	26	34		850	1/4 mile north 1.7n
78	25	26	4f	4a2	804	200 yds south of T/O 804 on the west side of the road
79	24	26	32j	32i2	965	1/4 mile north of T/O 965, 1/8 mile west of T/O 955, 200 yds north of T/O 966, west side of Rd 168. measure point 2".
80	25	26	5c	5a3	955	1/2 mile north of County line, 150 yds east of Rd 172, follow dirt road on westside of Orange Cove Hardware, east of T/O 955, submersible, dogs.
81	25	26	6	6g1		County line Road and Driver, Bassett Ave. Bees
82	25	26	8		916	119.1w 0.6s - 0.2w; north of T/O 916, west of T/O 916. Well covered with a disc plate. Lots of oil. Cannot read.

Delano-Earlimart Irrigation District

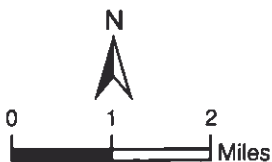
Monitoring Well Attributes

DEID Well No.	Township	Range	Section	Possible Section	Nearest Turnout	Notes
83	25	26	17d	17c1	923	Behind 1.6w 921; nearest T/O 923. bees near / no access
84	25	26	10a	10b3	820	200' of 820 in back of metal shop inside small metal pump house
85	25	26	15		847	South of 119.1e 1.4s - 2.5w
86	25	26	22c	22g1		1/8 mile east of Zerker, 1/4 mile south of dirt road. 200 yds north of Shultz Rd. 1/4 mile north of T/O 837, between Cecil and County Line. 1/4 mile south of Woolomes Ave, 1/4 mile east of Wallace Rd, behind reservoir
87	25	26	14		862	Oil in well
88	25	26	11a	11a2	872	Approx 35' west of 872.
89	25	26	12	12m1		Between Cecil and Garces along RR tracks at old 65. Need measure point.
90	25	26	1k	1q1		Need measure point
91	25	26	1e		D-15	Mushroom plant. Domestic well.



Legend

- Roads
- - - County Boundary
- Waterways
 - - - Streams/Rivers
 - Friant-Kern Canal
- Parcels
 - Excess Land
 - Delachments
 - DEID Boundary



Delano-Earlimart Irrigation District Excess Land Attachment 9

Note: Excess Lands are ineligible to receive Central Valley Project water due to the size of the land holdings. Excess Lands cover about 10% of the district.



**DELANO-EARLIMART IRRIGATION DISTRICT
2007 ANNUAL GROUNDWATER REPORT**



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**DELANO-EARLIMART IRRIGATION DISTRICT
GROUNDWATER MANAGEMENT PLAN**

APPENDIX A

**PUBLIC PARTICIPATION
IN PLAN ADOPTION**

1 7 2007

PROOF OF PUBLICATION

(2015.5 C.C.P.)
(GENERAL FORM)

STATE OF CALIFORNIA }
County of Kern } ss.

I, the undersigned, am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the chief clerk/publisher of *The Delano Record*, a newspaper of general circulation, printed and published weekly, in the City of Delano, County of Kern, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court order number 21125, of the County of Kern; that the notice, of which the annexed is a printed copy, has been published in each regular and entire issue of said newspaper and in any supplement thereof on the following dates, to-wit:

July 5, 12, 2007

I certify (or declare) under the penalty of perjury that the foregoing is true and correct.

David Brown
(Signature)

Executed on 7-12-07
at Delano, California

The DELANO RECORD
1231 Jefferson Street Phone (661) 725-0600
Delano, CA 93215

PUBLIC NOTICE

RESOLUTION NO. 07-06

of the

DELANO-EARLMART IRRIGATION DISTRICT

INTENTION TO UPDATE CURRENT GROUNDWATER MANAGEMENT PLAN:

WHEREAS, the Delano-Earlmart Irrigation District adopted a Groundwater Management Plan in December 2003 that is in accordance with Assembly Bill 3030; and

WHEREAS, the California Water Code permits the adoption and implementation of Groundwater Management Plans to encourage authorized local agencies to manage groundwater resources within their service areas; and

WHEREAS, updating the District's Groundwater Management Plan is in furtherance of and consistent with the District's goals and objectives; and

WHEREAS, the State of California recently adopted Senate Bill No. 1938, which amends new requirements for Groundwater Management Plans; and

WHEREAS, The District's existing plan needs to be updated to meet the requirements of Senate Bill No. 1938; and

WHEREAS, the District believes that updating and adopting a new Groundwater Management Plan will be in the best interests of the District's landowners and water users and can help meet the projected long-term water needs of the District; and

WHEREAS, a public hearing was held on June 21, 2007, to discuss the adoption and implementation of an updated groundwater management plan;

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of Delano-Earlmart Irrigation District that it is the intention of the District to update the District's Groundwater Management Plan in accordance with Senate Bill No. 1938 and that this resolution shall be deemed a resolution of intention in accordance with California Water Code Section 10753.2.

BE IT FURTHER RESOLVED that after such a plan has been prepared, the District will conduct a second public hearing in accordance with the California Water Code Section 10753.5, at such time to determine whether to adopt the plan.

BE IT FURTHER RESOLVED that the officers of the District are authorized and directed to publish this resolution of intention to update the District's groundwater management plan in accordance with the provisions of California Water Code Section 10753.9 and to provide interested persons with a copy of this resolution upon written request and to execute all documents and take any other action necessary or advisable to carry out the purposes of this resolution.

ADOPTED: June 21, 2007 upon motion of Director Carata, seconded by Director Carata and passed by the following vote:

AYES: 3

NOES: 0

ABSTAIN: 0

ABSENT: 2

CERTIFICATE OF SECRETARY

I do hereby certify that I am the Secretary of the Delano-Earlmart Irrigation District, an irrigation district organized and existing under the laws of the State of California, and that the foregoing Resolution was duly adopted by the Board of Directors of said District at a meeting thereof duly and regularly held at the office of the said District at 14181 Avenue 54, Delano, California, on the 21st day of June, 2007, at which meeting a quorum of said Board of Directors was at all times present and acting, and that said Resolution has not been rescinded or amended in whole or any part thereof, and remains in force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and the Seal of the Delano-Earlmart Irrigation District this 21st day of June 2007.

Dele R. Brown, Secretary
Delano-Earlmart Irrigation District
Publish Delano Record July 5, 12, 2007

CERTIFICATE OF SECRETARY

I do hereby certify that I am the Secretary of the Delano-Earlimart Irrigation District, an irrigation district organized and existing under the laws of the State of California, and that the foregoing Resolution was duly adopted by the Board of Directors of said District at a meeting thereof duly and regularly held at the office of the said District at 14181 Avenue 24, Delano, California on the 21st day of June, 2007, at which meeting a quorum of said Board of Directors was at all times present and acting, and that said Resolution has not been rescinded or amended in whole or any part thereof, and remains in force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and the Seal of the Delano-Earlimart Irrigation District this 21st day of June 2007.

Dale R. Brogan, Secretary
Delano-Earlimart Irrigation District

PROOF OF PUBLICATION

(2015.5 C.C.P.)
(GENERAL FORM)

STATE OF CALIFORNIA }
County of Kern } ss.

I, the undersigned, am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the chief clerk/publisher of *The Delano Record*, a newspaper of general circulation, printed and published weekly, in the City of Delano, County of Kern, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court order number 21125, of the County of Kern; that the notice, of which the annexed is a printed copy, has been published in each regular and entire issue of said newspaper and in any supplement thereof on the following dates,

to-wit:

July 26, August 2, 2007

I certify (or declare) under the penalty of perjury that the foregoing is true and correct.

Dale Bogan

(Signature)

Executed on 8-2-07
at Delano, California

The DELANO RECORD
1231 Jefferson Street Phone (661) 725-0600
Delano, CA 93215

PUBLIC NOTICE

NOTICE OF HEARING ON INTENTION TO ADOPT THE DELANO EARLIMART IRRIGATION DISTRICT'S UPDATED GROUNDWA- TER MANAGEMENT PLAN

NOTICE IS HEREBY GIVEN that on August 9, 2007 at 4:00 p.m., at 14181 Ave. 24, Delano, CA, a public hearing will be held to discuss whether or not the Delano-Earlimart Irrigation District should adopt an updated Groundwater Management Plan to be in compliance with California Senate Bill No. 1838.

Part 2.75 of Division 6 of the California Water Code permits the adoption and implementation of Groundwater Management Plans to encourage authorized local agencies to manage groundwater resources within their service areas.

The Groundwater Management Plan was prepared with input from the Board of Directors serving as the Groundwater Advisory Committee for this Plan update. Other landowners within the Delano-Earlimart Irrigation District and other interested parties are invited to attend the hearing. Copies of the proposed resolution and the updated Groundwater Management Plan will be available for review by the public at the hearing or may be obtained in advance at 14181 Ave. 24, Delano, California or by submitting a written letter to Dale Bogan, General Manager, Delano-Earlimart Irrigation District, 14181 Ave. 24, Delano, CA 93215. Opportunity for public questions & input will be provided at the hearing.

Dale Bogan

Secretary to the Board of Directors

Dated: July 13, 2007

Publish: *Delano Record* July 26; August 2, 2007.

RESOLUTION NO. 07-08
of the
DELANO-EARLIMART IRRIGATION DISTRICT

INTENTION TO ADOPT AN UPDATED
GROUNDWATER MANAGEMENT PLAN

WHEREAS, Part 2.75 of Division 6 of the California Water Code permits the adoption and implementation of groundwater management plans to encourage authorized local agencies to manage groundwater resources within their service areas; and

WHEREAS, the Delano-Earlimart Irrigation District adopted a Groundwater Management Plan in December 2003 in accordance with Assembly Bill 3030; and

WHEREAS, the Delano-Earlimart Irrigation District desires to adopt an updated Groundwater Management Plan that is consistent with recent amendments to the provisions of the California Water Code Section 10750 et. seq.; and

WHEREAS, a public hearing was duly noticed consistent with California Water Code Section 10753.2(a), and held on July 21, 2007 to discuss the adoption and implementation of the updated Groundwater Management Plan; and

WHEREAS, the Board of Directors believes that updating and adoption of a new Groundwater Management Plan will be in the best interests of its constituents and water users and can help meet the projected long-term water needs of the Delano-Earlimart Irrigation District; and

WHEREAS, no written protests, as prescribed in California Water Code Section 10753.6, were filed, and as therein provided, this Board may now adopt the proposed Groundwater Management Plan.

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the Delano-Earlimart Irrigation District that the District approves and adopts the Groundwater Management Plan in accordance with Part 2.75 of Division 6 of the California Water Code.

BE IT FURTHER RESOLVED that this resolution shall be deemed a resolution of intention in accordance with California Water Code Section 10753.2.

BE IT FURTHER RESOLVED that the officers of the District are authorized and directed to publish this resolution of intention to adopt the District's Groundwater Management Plan in accordance with the provisions of California Water Code Section 10753.3 and to provide interested persons with a copy of this resolution upon written request.

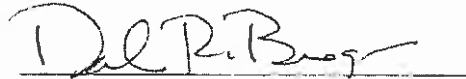
ADOPTED: August 9, 2007 upon motion of Director Canata, seconded by Director Hronis and passed by the following vote:

AYES: 4
NOES: 0
ABSTAIN: 0
ABSENT: 1

CERTIFICATE OF SECRETARY

I do hereby certify that I am the Secretary of the Delano-Earlimart Irrigation District, an irrigation district organized and existing under the laws of the State of California, and that the foregoing Resolution was duly adopted by the Board of Directors of said District at a meeting thereof duly and regularly held at the office of the said District at 14181 Avenue 24, Delano, California on the 9th day of August, 2007; at which meeting a quorum of said Board of Directors was at all times present and acting, and that said Resolution has not been rescinded or amended in whole or any part thereof, and remains in force and effect.

IN WITNESS WHEREOF, I have hereunto set my hand and the Seal of the Delano-Earlimart Irrigation District this 9th day of August 2007.

A handwritten signature in dark ink, appearing to read "Dale R. Brogan", is written over a horizontal line.

Dale R. Brogan, Secretary
Delano-Earlimart Irrigation District

Appendix A – Public Participation in Plan Adoption

DEID Groundwater Management Plan

The following are excerpts of various minutes of DEID Board of Director meetings as documentation of the public participation process conducted in adopting the Groundwater Management Plan.

The Board of Directors regular meeting on June 14, 2007:

“General Manager Brogan reported on the status of the update to the District’s groundwater management plan that Provost and Pritchard has been developing. The Board was reminded of the special Board meeting and public hearing that will be held on June 21, 2007 beginning at 4:00 p.m. at the District office. The purpose of the meeting is to give the public the opportunity to comment on the District’s intent to update the plan and to adopt a resolution that states the intent of the District to update the plan.”

“Also discussed with the Board was a proposal to create a landowner advisory committee for the purpose of assisting the Board with public involvement in the various groundwater planning and projects that it currently has in process. By consensus, the Board agreed that such a committee should be formed, with Directors’ Hronis and Canata to be the Board’s representatives on the committee.”

The Board of Directors special Board meeting on June 21, 2007:

See separate attachment of the complete minutes of this Board meeting.

The Board of Directors regular Board meeting on July 12, 2007:

“General Manager Brogan reviewed the updated groundwater management plan for the District that had been previously distributed to the Board. Also noted were the results of the public hearing that was held on June 21, 2007 on the updated plan. The Board was reminded that it was serving as the landowner advisory committee for the plan at this stage in its development and that comments received from the Board would be forwarded on to Provost and Pritchard Engineering for inclusion into the final draft plan. It was further noted that final review and adoption is scheduled for August 9, 2007.”

“Also reviewed with the Board was the response from those landowners invited to participate as members of a District groundwater advisory committee. It was reported that the response has been very positive. By consensus of the Board, the first meeting was set for August 2, 2007 beginning with dinner at 5:00 p.m.”

The Board of Directors regular meeting on August 9, 2007:

“General Manager Brogan reviewed the final draft of the updated groundwater management plan for the District. Noted were the edits had occurred in the final draft. It was further reported that the District’s Groundwater Advisory Committee had been given

a copy of the final draft at its inaugural meeting with comments requested. Following review and discussion, the following resolution was adopted:

RESOLUTION NO. 07-08
of the
DELANO-EARLIMART IRRIGATION DISTRICT

INTENTION TO ADOPT AN UPDATED GROUNDWATER MANAGEMENT PLAN

WHEREAS, Part 2.75 of Division 6 of the California Water Code permits the adoption and implementation of groundwater management plans to encourage authorized local agencies to manage groundwater resources within their service areas; and

WHEREAS, the Delano-Earlimart Irrigation District adopted a Groundwater Management Plan in December 2003 in accordance with Assembly Bill 3030; and

WHEREAS, the Delano-Earlimart Irrigation District desires to adopt an updated Groundwater Management Plan that is consistent with recent amendments to the provisions of the California Water Code Section 10750 et. seq.; and

WHEREAS, a public hearing was duly noticed consistent with California Water Code Section 10753.2(a), and held on July 21, 2007 to discuss the adoption and implementation of the updated Groundwater Management Plan; and

WHEREAS, the Board of Directors believes that updating and adoption of a new Groundwater Management Plan will be in the best interests of its constituents and water users and can help meet the projected long-term water needs of the Delano-Earlimart Irrigation District; and

WHEREAS, no written protests, as prescribed in California Water Code Section 10753.6, were filed, and as therein provided, this Board may now adopt the proposed Groundwater Management Plan.

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the Delano-Earlimart Irrigation District that the District approves and adopts the Groundwater Management Plan in accordance with Part 2.75 of Division 6 of the California Water Code.

BE IT FURTHER RESOLVED that this resolution shall be deemed a resolution of intention in accordance with California Water Code Section 10753.2.

BE IT FURTHER RESOLVED that the officers of the District are authorized and directed to publish this resolution of intention to adopt the District's Groundwater Management Plan in accordance with the provisions of California Water Code Section 10753.3 and to provide interested persons with a copy of this resolution upon written request.

ADOPTED: August 9, 2007 upon motion of Director Canata, seconded by Director Hronis and passed by the following vote:

AYES: 4

NOES: 0
ABSTAIN: 0
ABSENT: 1”

“Director Hronis and Director Canata reported to the Board on the first meeting of the District’s Groundwater Advisory Committee. It was reported that attendance was good and the presentation well received. Included in the presentation was a discussion and distribution of the draft updated Groundwater Management Plan with a request for Committee review and comments. The Board was provided with a roster of the Committee members and was further advised that the next meeting of the Committee is expected in late September or early October.”

#

**DELANO-EARLIMART IRRIGATION DISTRICT
BOARD OF DIRECTORS MEETING**

June 21, 2007

The Board of Directors of the Delano-Earlimart Irrigation District met for a special Board meeting and public hearing on June 21, 2007 at the District office. In attendance were Vice-president Pete Hronis, Director Anton Caratan and Director Nick Canata (via telephone). Also present was General Manager Dale Brogan. President Harold Nelson and Director Kelley Hampton were absent. In the absence of President Nelson, Vice-president Hronis presided and convened the meeting at 4:25 p.m.

PUBLIC HEARING:

General Manager Brogan reviewed with the Board its previous decision to update the District's groundwater management plan (GMP). AS required by state law, a public hearing must be noticed and held for the purpose of receiving any comments from landowners and the public on the District's intention to update its GMP. General Manager Brogan reported that the required legal notices had been published for this public hearing.

Vice-president Hronis opened the meeting for public comments. With no members of the public present and no comments offered, the public comment period was closed. General Manager Brogan also noted for the Board that the District had not received any written comments as well.

The Board then considered a proposed resolution with regard to the intention to update the District's GMP. Following discussion, the following resolution was adopted:

**RESOLUTION NO. 07-06
of the
DELANO-EARLIMART IRRIGATION DISTRICT**

INTENTION TO UPDATE CURRENT GROUNDWATER MANAGEMENT PLAN

WHEREAS, the Delano-Earlimart Irrigation District adopted a Groundwater Management Plan in December 2003 that is in accordance with Assembly Bill 3030; and

WHEREAS, the California Water Code permits the adoption and implementation of Groundwater Management Plans to encourage authorized local agencies to manage groundwater resources within their service areas; and

WHEREAS, updating the District's Groundwater Management Plan is in furtherance of and consistent with the Districts' goals and objectives; and

WHEREAS, the State of California recently adopted Senate Bill No. 1938, which specifies new requirements for Groundwater Management Plans; and

WHEREAS, The Districts' existing plan needs to be updated to meet the requirements of Senate Bill No. 1938; and

WHEREAS, the Districts believe that updating and adopting a new Groundwater Management Plan will be in the best interests of the District's landowners and water users and can help meet the projected long-term water needs of the Districts; and

WHEREAS, a public hearing was held on June 21, 2007, to discuss the adoption and implementation of an updated groundwater management plan;

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of Delano-Earlimart Irrigation District that it is the intention of the District to update the District's Groundwater Management Plan in accordance with Senate Bill No. 1938 and that this resolution shall be deemed a resolution of intention in accordance with California Water Code Section 10753.2.

BE IT FURTHER RESOLVED that after such a plan has been prepared, the District will conduct a second public hearing in accordance with the California Water Code Section 10753.5, et seq. to determine whether to adopt the plan;

BE IT FURTHER RESOLVED that the officers of the District are authorized and directed to publish this resolution of intention to update the Districts' groundwater management plan in accordance with the provisions of California Water Code Section 10753.3 and to provide interested persons with a copy of this resolution upon written request and to execute all documents and take any other action necessary or advisable to carry out the purposes of this resolution.

ADOPTED: June 21, 2007 upon motion of Director Canata, seconded by Director Caratan and passed by the following vote:

AYES: 3
NOES: 0
ABSTAIN: 0
ABSENT: 2

ADJOURNMENT:

Vice-president Nelson asked if there were any other matters to be brought before the Board at this time. Hearing none, on motion of Director Caratan, seconded by Director Canata and unanimously carried, the meeting was adjourned at 4:30 p.m.

Delano-Earlimart Irrigation District
Groundwater Advisory Committee Meeting
August 2, 2007

MINUTES

The inaugural meeting of the Delano-Earlimart Irrigation District Groundwater Advisory Committee (GAC) meeting was held on August 2, 2007. The meeting began at 5:00 p.m. with dinner, and concluded at approximately 7:00 p.m. A list of attendees is attached.

Delano-Earlimart Irrigation District (DEID) General Manager Dale Brogan welcomed the GAC on behalf of the DEID Board of Directors. Following self-introductions, an agenda was distributed.

Groundwater Committee

The GAC composition was discussed, noting that individuals selected had either previously indicated an interest in District groundwater banking or were located near the current Turnipseed recharge basin, which is the site of a proposed groundwater banking pilot project. It was also noted that the GAC also includes two representatives from the DEID board of directors, Pete Hronis and Nick Canata. The GAC was also advised that it will be staffed by the General Manager with technical input from Provost and Pritchard Engineering.

The GAC was advised that meetings would probably be quarterly for the next 12 months. Following the first year, the meeting schedule will be determined based on the findings of the pilot project investigation and any decision to proceed with an expanded groundwater banking program.

Committee responsibilities

Brogan explained the two current responsibilities of the GAC:

- Review and provide input into DEID's Groundwater Management Plan, which is currently being updated. This is a very short-term goal. Copies of the draft Plan were distributed with a request to provide comments on the draft by next week.
- Provide technical oversight and policy recommendations to the DEID board of directors on a groundwater banking pilot project that DEID is proposing. The GAC will also be asked to provide landowner participation and input into the ongoing evaluation process of a proposed groundwater banking program.

Committee participation In the groundwater banking project

Brogan provided to the GAC a list that outlined the near-term and long-term goals for the GAC regarding groundwater banking. That list was reviewed and included the following:

Near-term goals -

- Assist in the design of the elements of the pilot project investigation, including a groundwater monitoring plan;
- Review of pilot project investigation findings;

- Assessment of local support for the program (local concerns, impact mitigation, etc) and advise on public participation process;
- Development of a monitoring plan for the pilot project that can be used as the basis for a potential future expanded banking program.

Long-term goals (provided that the pilot project identifies a feasible groundwater banking project/program for DEID) -

- Continue to provide impartial oversight and act in an advisory capacity to DEID on all aspects of a future program;
- Review annual data and provide guidance in response to local concerns based on review of the data and project operations;
- Recommend necessary changes to mitigate potential significant adverse impacts, if any (i.e. preventing increases in local water levels that could impact root zone, groundwater over-pumping from the extraction wells etc.);
- Identify program benefits.

DEID Background Information

Brogan and technical advisors John Kirk (Provost and Pritchard Engineering) and Richard Moss (Provost and Pritchard Engineering) reviewed the historical DEID water sources, water use, and regional groundwater levels and trends. Also discussed were land use patterns, excess lands and water requirements/water availability, in-lieu and direct groundwater recharge programs (with the historical emphasis on in-lieu), and the potential of expanding groundwater banking throughout DEID. Also discussed was the planned use of the Turnipseed groundwater recharge basin as a pilot project to determine the feasibility of a banking program for DEID.

Description of Groundwater Banking Pilot Project

Brogan, Kirk and Moss described plans to initially investigate and, based on the results of the investigation, construct a pilot project that will convert the Turnipseed groundwater recharge basin to groundwater banking project. It would include constructing at least one extraction well so past and future water recharged by the District can be recovered and delivered to DEID growers. It was further noted that the results of the pilot project will serve as the basis for future consideration of an expanded banking program for DEID.

Overview of Existing Turnipseed Basin Operations

Brogan provided a history on the Turnipseed basin, when it was acquired, past and present use, water sources for the basin, and how water is conveyed to basin. Also reviewed was the cost of water delivered to the Turnipseed basin and how that accelerated cost, with no means to recover that cost or develop a District-wide benefit for the recharge operation, has lead to a declining use of the basin.

Brogan further reviewed the history of other groundwater recharge methods that have occurred in DEID, which were through irrigation of crops with imported surface water (infiltration of water not used by plants to the groundwater table) and using surface water instead of groundwater pumping (in-lieu recharge).

Proposed Turnipseed Groundwater Bank Operations

Brogan described for the GAC how the Turnipseed basin would be used in a groundwater banking operation, with recharge water introduced in wet years and extracted from DEID-owned wells during dry years to supplement the overall DEID water supply. Monitoring for water quality changes in the existing groundwater was also listed as a part of a banking program.

Pilot Project Schedule

The following schedule for the Turnipseed basin groundwater banking pilot project was provided:

- Formation of GAC - August 2007;
- Development of monitoring program, including addition of new monitoring wells - Fall 2007;
- Begin monitoring program - Fall 2007;
- Design of extraction wells - Winter 2007;
- Beginning of basin operation and delivery of water for recharge - Spring 2008.
- Drilling of test hole for extraction wells and construction of extraction well - Spring 2008;
- Extraction well operational - Summer 2008.

Next Meeting

The GAC was asked to plan on its next meeting for sometime in late September/early October. The agenda for that meeting will focus on the components of the pilot project investigation, including the groundwater extraction plan, monitoring program, groundwater model development, and program reporting.

MEETING NOTES



Project	DEID Groundwater Management Plan	Project Number	1326 0701
Meeting Date	May 30, 2007	Meeting Location	P&P Visalia
Subject	Kickoff Meeting		
Client	Delano-Earlimart Irrigation District		
Notes by	Owen Kubit		

Attendees:

Owen Kubit – P&P

John Kirk – P&P

Ronald Samuelian – P&P

Dale Brogan - DEID

MEETING NOTES

Studies

- Brogan will send P&P information on the Poso Creek Group Integrated Regional Water Management Plan.
- The District does not have any resolutions or ordinances regarding groundwater management, other than the resolution adopting the 2003 Groundwater Management Plan (GMP).

Public Participation

- District Board meetings are held on the second Thursday of each month. Upcoming meetings will be held on June 14, July 12 and August 9, 2007.
- Brogan typically sends information to Board members the week before the meeting. As a result, he will need a copy of the draft GMP by Friday, July 6.

Interagency Coordination

DEID is a member of the San Joaquin Valley Water Quality Coalition. Through coalition efforts, water quality in the White River was tested in 2005-2006. Brogan will send P&P information on the Coalition.

Monitoring

- Irrigation Concepts measures groundwater levels for DEID twice each year.
- The District does not perform any groundwater quality monitoring.
- The District does not measure flowrates in any surface waters. Water flows occur in the White River about one in every 10 years.
- Horizontal coordinates for district monitoring wells were determined using a handheld GPS device. Elevations were probably determined from a USGS Quadrangle Map.

- DEID does not know if land subsidence is occurring. The importation of large volumes of surface water may have arrested the land subsidence.
- The District does not have any documented monitoring protocols.

Banking/Recharge

- DEID currently banks 30,000 AF in North Kern Water Storage District. DEID would like to keep this water labeled as Friant CVP water so that it can be conveyed in the Friant-Kern Canal after it is extracted.
- DEID is currently performing a study with Pixley ID to investigate alternatives for banking DEID water in Pixley ID.
- DEID may be interested in banking water for other agencies inside DEID.
- Since there has not been a dry year in several years, some local growers have a false sense of security and believe that DEID can provide a firm and reliable water supply every year. Currently this is not possible, but the District would like to achieve this through groundwater recharge and banking projects.

San Joaquin River Settlement

- The San Joaquin River Settlement will reduce surface water supplies for DEID. One estimate shows that deliveries would be reduced by an average of 5,000 AF/year of Class I water and 5,000 AF/year of Class II water. However, total losses could be as high as 30,000 AF/year in semi-dry years.
- DEID has a goal of fully recovering from these lower surface water deliveries through other programs, especially groundwater recharge and banking.

Excess Lands

Excess lands in DEID are not permitted to use CVP water due to the size of the property. These lands primarily use groundwater. Finding alternative water supplies for these lands is a high priority for DEID. This could be achieved through water transfers and exchanges for non-project water, or 're-coloring' CVP water by recharging and later extracting it.

Groundwater Quality

- Groundwater quality in the District generally improves with depth.
- Groundwater quality problems in DEID include DBCP and nitrates. The problems are known to generally be widespread, but no groundwater quality maps are available.

Water Reliability

Groundwater management in DEID is based on in-lieu recharge. Any programs that reduce groundwater pumping are therefore considered good.

Subject: Meeting Minutes – DEID Groundwater Management Plan

Date: May 30, 2007

Page: 3

Schedule

- DEID will call some farmers before the July Board meeting to ask if they want to participate in the development of the GMP.
- P&P will send a draft GMP to DEID at the end of June 2007.

Other

- DEID does not own any wells except for a small domestic well that serves their District office. DEID has considered installing extraction wells to supplement their surface water supply. The wells would also be larger and probably more economical to construct and operate than smaller grower wells.
- Grower education is achieved through a quarterly District newsletter.
- Delano and Earlimart are both outside of the district boundaries. DEID has never been approached by either community about purchasing or using wastewater effluent. Brogan does not know what they currently do with their wastewater effluent.
- DEID would like to begin preparing annual groundwater reports.
- Brogan does not know of any groundwater disputes that have occurred in DEID. When a dispute occurs the grower is instructed to try to resolve it with the operations superintendent; if that is not successful then with the District Manager, and if that is not successful then with the District Board of Directors.